Proceedings of the American Academy of Arts and Sciences.

VOL. XXXII. No. 17. — JULY, 1897.

PROCEEDINGS OF THE ACADEMY, 1896-1897.

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PROCEEDINGS.

Eight hundred and eighty-third Meeting.

May 13, 1896. — ANNUAL MEETING.

VICE-PRESIDENT George L. Goodale in the chair.

The chair announced the death of Atticus Green Haygood, Associate Fellow.

The Corresponding Secretary read the following letters: from Charles Lane Poor and T. R. Lounsbury, acknowledging their election as Associate Fellows; from the Librarian of the Boston Public Library, announcing the preparation of a list of serial publications now taken in the principal local libraries, and inviting correspondence from persons owning periodicals not to be found in public collections and willing to offer them for occasional consultation; from the College of New Jersey, inviting the Academy to send a delegate to the sesquicentennial celebration of the founding of the College; and from the Principal of the University of Glasgow and the Lord Provost of Glasgow, inviting the Academy to appoint a representative to attend the jubilee of Lord Kelvin on the 15th and 16th of June next. The chair appointed William Everett delegate to the celebration at Princeton.*

The Corresponding Secretary read the Report of the Council.

The Treasurer presented his annual report, of which the following is an abstract: —

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* Mr. Everett being unable at the last moment to attend, his place was filled by the appointment of Horace E. Scudder, as substitute.

General Fund.

Receipts.

Balance, May 1st, 1895			$2,675.24
Sale of bonds			15,233.75
			17,908.99
Assessments	$1,050.00		
Sale of publications	9.10	$1,059.10	
Income from investments		4,677.00	
Return of bank tax		51.51	
Gift of E. C. Clarke		100.00	
Gift of F. H. Storer		5.00	5,892.61
			$23,801.60

Expenditures.

General expenses		$2,039.00	
Publishing expenses		1,939.14	
Library expenses		1,157.78	$5,135.92
Investments			16,550.00
Balance			2,115.68
			$23,801.60

Rumford Fund.

Receipts.

Balance May 1st, 1895			$5,863.70
Sale of bonds			3,550.00
Income		$1,952.00	
Return of bank tax		91.72	2,043.72
			$11,457.42

Expenditures.

Books and binding		$140.17	
Rent		10.00	
Investigations		1,000.00	
Publishing expenses		71.42	
Rumford Medal		327.50	1,549.09
Investments			8,000.00
Balance			1,908.33
			$11,457.42

WARREN FUND.

Receipts.

Balance, May 1st, 1895	$374.89
Income	840.00
	$1,214.89

Expenditures.

Investigations	$600.00
Balance	614.89
	$1,214.89

BUILDING FUND.

Receipts.

Balance, May 1st, 1895	$843.68
Income	445.00
	$1,288.68

Expenditures.

Investment	$1,000.80
Balance	288.68
	$1,288.68

The Librarian presented his annual report, which showed that 3,096 books and pamphlets had been added to the Library during the year, 2,106 of which were obtained by gift and exchange, 748 by purchase with the appropriation from the General Fund, and 242 with the appropriation from the Rumford Fund. 345 volumes were bound at an expense of $383.55, of which $22.35 were charged to the Rumford Fund. The total expenditure for books, periodicals, and binding amounted to $1,297.95, of which $140.17 were charged to the Rumford Fund. 196 books were borrowed by thirty-five persons, of whom twenty-three were Fellows of the Academy.

The following reports were also presented: —

REPORT OF THE RUMFORD COMMITTEE.

The Rumford Committee has considered since the last annual meeting of the Academy all possible candidates for the Rumford Medal, but has been unable to reach a conclusion, and therefore does not recommend any

one for the medal at this time. The Rumford Committee has been presented by Professor Marcou with copies of forty-eight letters written by Count Rumford to Professor Pictet of Geneva. The committee voted to recommend to the Academy that it authorize the printing at the expense of the Rumford Fund of the following four papers, and that a sum of $25 be appropriated for illustration of these papers.

The titles of these papers are as follows: —

1. Thermo-electric Interpolation Formulæ, by S. W. Holman.

2. The Melting Points of Aluminum, Silver, Gold, Copper, and Platinum, by S. W. Holman with R. R. Lawrence and L. Barr.

3. Pyrometry: Calibration of the Le Chatelier Thermoelectric Pyrometer, by S. W. Holman.

4. Calorimetry: Methods of Cooling Correction, by S. W. Holman.

The committee voted to authorize the publication in the American Journal of Science of a preliminary account of an investigation on the thermal conductivities of certain kinds of stone, by Prof. B. O. Peirce and Dr. R. W. Willson. Professor E. H. Hall's paper on the Thermal Conductivity of Mild Steel was presented to the Academy, January 8, 1896, and has been published by the aid of the Rumford Fund.

It is the desire of the Committee that the vote of the Academy at its last annual meeting to appropriate from the Rumford Fund the sum of one thousand dollars, to be expended at the discretion of the committee in aid of investigations in light and heat, — payments from the sum to be made on the order of the Chairman of the Committee, — should be reaffirmed at the present meeting.

JOHN TROWBRIDGE,
Chairman Rumford Committee.

REPORT OF THE C. M. WARREN COMMITTEE.

I have to report that the recipients of the money granted by the Academy from the Cyrus M. Warren Fund have been doing good work.

This statement is borne out very emphatically by the publications of Professor Mabery, which are of a high order of excellence.

At the last annual meeting it was voted by the Academy "that the C. M. Warren Committee be requested to consider the propriety of appropriating $50 from the income of the C. M. Warren Fund for the purchase of books relating to chemical research."

This question has been carefully considered by the committee. After full debate, it was voted that "In the opinion of the Committee no general appropriation for the purchase of books can properly be made from the C. M. Warren Fund."

F. H. Storer, *Chairman.*

On the recommendation of the Committee of Finance it was

Voted, To make the following appropriations from the income of the General Fund for the ensuing year: —

For general expenses	$1,950.00
For the Library	1,350.00
For publications	2,300.00

Voted, That the assessment for the ensuing year be five dollars ($5.00).

In accordance with the recommendation of the Rumford Committee it was

Voted, That one thousand dollars ($1,000) from the income of the Rumford Fund be placed at the disposal of the Rumford Committee, to be expended in aid of investigations in light and heat, payments to be made on the order of the Chairman of the Committee.

In accordance with the recommendation of the C. M. Warren Committee, it was

Voted, To appropriate six hundred dollars ($600) from the income of the C. M. Warren Fund to C. F. Mabery, of Cleveland, Ohio, in aid of his researches on the chemistry of petroleum.

Upon motion it was

Voted, That the thanks of the Academy be tendered to Charles Loring Jackson for his faithful and efficient services as Corresponding Secretary.

The annual election resulted in the choice of the following officers and committees: —

ALEXANDER AGASSIZ, *President.*
BENJAMIN A. GOULD, *Vice-President for Class I.*
GEORGE L. GOODALE, *Vice-President for Class II.*
AUGUSTUS LOWELL, *Vice-President for Class III.*
SAMUEL H. SCUDDER, *Corresponding Secretary.*
WILLIAM WATSON, *Recording Secretary.*
ELIOT C. CLARKE, *Treasurer.*
HENRY W. HAYNES, *Librarian.*

Councillors.

HENRY MITCHELL,
LEONARD P. KINNICUTT, } of Class I.
EDWIN H. HALL,

HENRY P. BOWDITCH,
WILLIAM M. DAVIS, } of Class II.
ROLAND THAXTER,

ANDREW M. DAVIS,
HORACE E. SCUDDER, } of Class III.
JOHN E. HUDSON,

Member of Committee of Finance.

AUGUSTUS LOWELL.

Rumford Committee.

JOHN TROWBRIDGE, CHARLES R. CROSS,
ERASMUS D. LEAVITT, AMOS E. DOLBEAR,
EDWARD C. PICKERING, BENJAMIN A. GOULD,
ARTHUR G. WEBSTER.

C. M. Warren Committee.

FRANCIS H. STORER, HENRY B. HILL,
CHARLES L. JACKSON, LEONARD P. KINNICUTT,
SAMUEL CABOT, ARTHUR M. COMEY,
ROBERT H. RICHARDS.

The chair appointed the following Standing Committees: —

Committee of Publication.

SAMUEL H. SCUDDER, SETH C. CHANDLER,
CRAWFORD H. TOY.

Committee on the Library.

AMOS E. DOLBEAR, G. STANLEY HALL,
SAMUEL HENSHAW.

Auditing Committee.

HENRY G. DENNY, JOHN C. ROPES.

In accordance with a vote adopted at the meeting of the 8th of April, the Rumford Premium, awarded at the last annual meeting to Thomas Alva Edison, was presented, John Trowbridge acting as Mr. Edison's proxy.

Vice-President Goodale, in presenting the medals, made the following remarks: —

It would be highly presumptuous for one whose knowledge of physics is of the most elementary character to occupy the time of the Academy by any statement of his own in conveying these medals. Happily such a course is unnecessary. The Chairman of the Rumford Committee has placed at our command a brief statement which makes clear the ground of the award.

"The Rumford Committee voted, June 22, 1893, that it is desirable to award the Rumford Medal to Thomas Alva Edison, in recognition of his investigation in the field of electric lighting, and they confirmed this vote on October 9, 1893, in the following words: 'Voted for the second time to recommend to the Academy that the Rumford Medal be awarded to Thomas Alva Edison for his investigations in electric lighting.'

"The Committee reached the conclusion expressed by these votes after long deliberation and after careful sifting of all the evidence which was at their disposal in regard to Mr. Edison's claim for priority in the construction of the incandescent lamp, the conception of the central lighting station, together with the multitude of devices, such as the three-wire circuit, the disposition of the electric current feeders, and the necessary methods for maintaining the electric potential constant.

"The Committee felt that they could not decide upon Mr. Edison's claims for priority in any particular invention in this new industry. Indeed, courts of law after prolonged litigation have found it difficult to decide how far Mr. Edison was in advance of contemporary workers. The task given to the Rumford Committee to decide who is the most worthy of the Rumford Medal, especially in the field of the application of electricity for the production of light and heat, is not an easy one. The number of investigators is now so large that it is no longer possible in general for one man to claim to be the first to apply electricity to a new field. The successful application is the result of many minds working on the same problem. Although the Committee did not feel justified in expressing the opinion that Mr. Edison invented the incandescent carbon filament lamp, or that he was the first to arrange such lamp in multiple on the circuit, thus producing what is popularly termed a subdivision of the electric light, or that the Edison dynamo had greater merits than the machine of Gramme and Siemens and others; still they are convinced that Mr. Edison gave a great impulse to the new industry, and that he was the first to successfully install a central electric lighting plant with the multitude of practical devices which are necessary. They believe that this impulse was due to his indefatigable application, to his remarkable instinct in whatever relates to the practical application of electric circuits, and to his inventive genius. They therefore have unanimously recommended to the Academy to bestow the Rumford Medals upon him, feeling that the work of Mr. Edison would especially appeal to the great founder of the medals, Count Rumford, if he were living."

The Academy has accepted the report of the Rumford Committee, and has voted to confer the gold and the silver medal upon Mr. Edison. The recipient finds it impossible to be present at this meeting of the Academy, and has requested Professor Trowbridge to act as his proxy, and to receive the medals for him.

In the name of the Academy I beg you, Professor Trowbridge, to accept the charge of conveying these medals to Mr. Edison's hands. It would be most ungracious for us who are assembled in this room, which is flooded by this steady and brilliant electric light, to withhold our personal thanks for what Mr. Edison's investigations and practical activities have done for us all. And, hence, I may venture to say that our thanks and all good wishes are to be conveyed with the Rumford Medals.

Professor Trowbridge replied as follows: —

Mr. President and Gentlemen of the Academy, — I accept the medals for Mr. Edison, and at his request I wish to express his deep sense of the great honor the Academy has conferred upon him. His work in the field of electric lighting has been the subject of prolonged litigation, and at times he has had doubts in reading the opinions of learned experts whether this work has been original or whether he has really contributed anything to the world's progress. The recognition of his labors by the American Academy of Arts and Sciences, regarded by Count Rumford in his gifts as the coequal of the Royal Society of London, is therefore especially grateful to him. Acting as his proxy, I thank the members of the Academy for the distinction which they have by their votes conferred upon him.

The following papers were presented by title: —

A Revision of the Atomic Weight of Magnesium. By Theodore William Richards and H. G. Parker.

A Revision of the Atomic Weight of Strontium. Second Paper: The Analysis of Strontic Chloride. By T. W. Richards and H. G. Parker.

Contributions from the Gray Herbarium of Harvard University. New Series, No. 10: — 1. Revision of the Genus *Tridax*. 2. Synopsis of the Mexican and Central American Species of the Genus *Mikania*. 3. Revision of the Genus *Zinnia*. 4. Revision of the Mexican and Central American Species of the Genus *Calea*. 5. A Provisional Key to the Species of *Porophyllum* ranging north of the Isthmus of Panama. 6. Descriptions of new and little known Phanerogams, chiefly from Oaxaca. By B. L. Robinson and J. M. Greenman.

On the group of real Linear Transformations whose Invariant is a real Quadratic Form. By Henry Taber.

David W. Cheever read an obituary notice of Richard M. Hodges.

Eight hundred and eighty-fourth Meeting.

October 14, 1896. — STATED MEETING.

The PRESIDENT in the chair.

The following deaths were announced: Thomas Tracy Bouvé and Francis James Child, Resident Fellows; George Brown

Goode and Hubert Anson Newton, Associate Fellows; and Heinrich Ernst Beyrich, Ernst Curtius, Friedrich August Kekulé, Baron Ferdinand von Mueller, and Jules Simon, Foreign Honorary Members.

In the absence of the Corresponding Secretary, Charles Loring Jackson was requested to act in his place, and read the following letters: from Karl Weinhold, Alexandre Kovalevsky, M. Foster, and B. L. Gildersleeve, acknowledging their election into the Academy; from a committee of the Society of Colonial Wars in the District of Columbia, proposing a joint memorial meeting in memory of George Brown Goode; from the International Geological Congress, enclosing the programme for its seventh session; from the Northwest Mining Association, suggesting the creation of a Department of Mines in the United States Government as a cabinet office; from the widow of Heinrich Ernst Beyrich, announcing the death of her husband; from the Academy "Gioenia" of Natural Sciences at Catania, announcing the death of its President, Giuseppe Zurria; from General-Major Rykatchew, reporting his appointment as Director of the Central Physical Observatory at St. Petersburg in place of Heinrich Wild, resigned; and from the committee of the British Association for the Advancement of Science on Zoölogical Bibliography and Publication, asking for the cooperation of learned societies in the method of publishing scientific papers.

James Coolidge Carter, of New York, was elected an Associate Fellow in Class III., Section 1, in place of the late Atticus Green Haygood.

Alpheus Hyatt read a paper entitled, Cycle in the Life of the Individual (Ontogeny) and in the Evolution of its own Group (Phylogeny).

The following papers were presented by title: —

The Constituents of Pennsylvania, Ohio, and Canadian Petroleum between 150° and 220°. By Charles F. Mabery.

Refractive Power of the Hydrocarbons and Chlorine Derivatives described in the Preceding Paper. By Charles F. Mabery and Edward J. Hudson.

On the Butanes and Octanes in American Petroleum. By Charles F. Mabery and Edward J. Hudson.

On the Sulphur Compounds and Unsaturated Hydrocarbons in Canadian Petroleum. By Charles F. Mabery and William O. Quayle.

On the Composition of a South American Petroleum. By Charles F. Mabery and Arthur S. Kittelberger.

On the Specific Refractive Power of Petroleum Hydrocarbons, and some of their Derivatives. By Charles F. Mabery and Edward J. Hudson.

The Viscosity of Mercury Vapor. By A. A. Noyes and H. M. Goodwin.

Contributions from the Zoölogical Laboratory of the Museum of Comparative Zoölogy at Harvard College. E. L. Mark, Director. No. 73. — Studies in Morphogenesis. 6. A Contribution to the Quantitative Study of Correlated Variation and the Comparative Variability of the Sexes. By C. B. Davenport and C. Bullard.

Voted, To meet on adjournment on the second Wednesday in November.

Eight hundred and eighty-fifth Meeting.

November 11, 1896. — ADJOURNED STATED MEETING.

VICE-PRESIDENT George L. Goodale in the chair.

As a quorum for business was not present it was

Voted, To meet on adjournment on the second Wednesday in December.

Eight hundred and eighty-sixth Meeting.

December 9, 1896. — ADJOURNED STATED MEETING.

The Academy met at the house of the President in Cambridge. The PRESIDENT in the chair.

The chair announced the death of Benjamin Apthorp Gould, Vice-President of the Academy for Class I., and of Hugo Gyldén, Foreign Honorary Member.

The Corresponding Secretary read a letter from James C. Carter, acknowledging his election as Associate Fellow.

On the motion of Charles L. Jackson it was

Voted, That the money received from the sales of publications in any year be appropriated for the publications of that year.

Voted, That the sum of four hundred and sixty-one dollars be added to the appropriation for publications this year, as this is the amount of the subscription raised to be used for publications, but not yet appropriated for this purpose.

On the motion of S. C. Chandler it was

Voted, To grant the use of the Hall of the Academy to the Colonial Society of Massachusetts on the third Wednesday of each of the five months December to April, in the same way as during the past year.

In view of the expected absence of the Recording Secretary, the President appointed William R. Livermore Recording Secretary *pro tempore*.

John E. Wolff exhibited a crystal of tourmaline from Paris, Maine, which had just been given to the Harvard Mineralogical Museum, and is remarkable for its size and color. It is seven inches long, with a diameter varying from two to three inches, and weighs twelve hundred and twelve grammes, or two pounds eleven ounces avoirdupois. The color is a clear, transparent green, except at one end, where the crystal is tipped with red (rubellite) for half an inch. This is said to be the largest crystal of gem quality ever taken out from that famous locality.

William R. Livermore read a paper entitled, The Growth of the Roman Dominions in Europe from 650 B. C. to 200 A. D., illustrated by one hundred Sketches for an Atlas of Historical Geography.

The President described his recent explorations of the Florida elevated reefs, in connection with those of L. S. Griswold of Southern Florida.

Eight hundred and eighty-seventh Meeting.

January 13, 1897. — STATED MEETING.

The PRESIDENT in the chair.

The chair announced the death of Francis Amasa Walker, Resident Fellow; Henry Newell Martin, Associate Fellow; and Emil Heinrich Du-Bois Reymond, Foreign Honorary Member.

The Corresponding Secretary read letters from the Secretary of the Pasteur Committee in Washington, announcing the opening of subscriptions in America, and inviting the Academy to participate, and from the Observatory of San Salvador announcing the death of its director, Don Alberto Sanchez.

The vacancies occasioned by the death of Benjamin A. Gould were filled by the election of

JOHN TROWBRIDGE, *Vice President for Class I.*

THEODORE W. RICHARDS, *Member of the Rumford Committee.*

On the recommendation of the C. M. Warren Committee it was

Voted, That the sum of two hundred dollars ($200) from the income of the C. M. Warren Fund be granted to H. O. Hofman, of Boston, for the prosecution of a research on the formation temperatures of slags in the smelting of ores of lead and copper or other metals.

S. H. Scudder read by title a paper on The Genera of North American Melanopli.

A. Lawrence Rotch read a paper on Obtaining Meteorological Records in the Upper Air by Means of Kites and Balloons.

Eight hundred and eighty eighth Meeting.

February 10, 1897.

The Academy met at the house of A. Lawrence Rotch.

The PRESIDENT in the chair.

The following papers were read: —

The Hebrew and Muhammedan Calendars. By William E. Story.

Forts Henry and Donelson. By John C. Ropes.

Eight hundred and eighty-ninth Meeting.

March 10, 1897. — STATED MEETING.

VICE-PRESIDENT John Trowbridge in the chair.

The Corresponding Secretary read a letter from the Royal Academy of Sciences of Turin, announcing the death of Luigi Schiaparelli; also, one giving notice of the terms for competition for the eleventh Bressa prize.

The chair appointed the following committee to nominate officers for the ensuing year: —

Leonard P. Kinnicutt, of Class I., Henry P. Bowditch, of Class II., and Andrew M. Davis, of Class III.

The following gentlemen were elected Members of the Academy: —

Charles Henry Fernald, of Amherst, to be a Resident Fellow in Class II., Section 3 (Zoölogy and Physiology).

Ludwig Boltzmann, of Vienna, to be a Foreign Honorary Member in Class I., Section 2 (Physics), in place of the late Friedrich August Kekulé.

Wilhelm Pfeffer, of Leipsic, to be a Foreign Honorary Member in Class II., Section 2 (Botany), in place of the late Baron Ferdinand von Mueller.

Wilhelm Dörpfeld, of Athens, to be a Foreign Honorary Member in Class III., Section 2 (Philology and Archæology), in place of the late Ernst Curtius.

The following papers were read: —

International Bimetallism. By George S. Boutwell.

On the Minimal Nutrients of Bacteria in Water. By W. T. Sedgwick and D. D. Jackson.

An Investigation of some of the Bacteriological Aspects of the Art of Tanning. By S. C. Prescott. (By invitation.)

The Energy Conditions necessary to produce the Röntgen Rays. By John Trowbridge. (By title.)

Eight hundred and ninetieth Meeting.

April 14, 1897.

The Academy met at the house of John C. Ropes.

VICE-PRESIDENT George L. Goodale in the chair.

The chair announced the death of James Joseph Sylvester and Karl Weierstrass, Foreign Honorary Members in Class I, Section 1.

The following papers were read: —

The study of English at Harvard College. By Barrett Wendell.

Electricity and Ether. By Arthur G. Webster.

The following papers were presented by title: —

A Measure of Variability and the Relation of individual Variations to specific Differences. By Edwin Tenney Brewster. Presented by E. L. Mark.

Contributions from the Gray Herbarium of Harvard University. New Series, No. XI. — 1. Revision of the Mexican and Central American Species of *Houstonia*. 2. Key to the Mexican Species of *Liabum*. 3. Descriptions of new and little known Plants from Mexico. By J. M. Greenman. Presented by B. L. Robinson.

AMERICAN ACADEMY OF ARTS AND SCIENCES.

REPORT OF THE COUNCIL. — PRESENTED MAY 12, 1897.

BIOGRAPHICAL NOTICES.

FRANCIS JAMES CHILD . . . . . By C. E. NORTON.
THOMAS TRACY BOUVÉ . . . . . W. O. CROSBY.
FRANCIS AMASA WALKER . . . . . CHARLES F. DUNBAR.
BENJAMIN APTHORP GOULD . . . . . SETH C. CHANDLER.

REPORT OF THE COUNCIL.

SINCE the Annual Meeting of May 13, 1896, the Academy has lost by death seventeen members: —four Resident Fellows, Thomas Tracy Bouvé, Francis James Child, Benjamin Apthorp Gould, and Francis Amasa Walker; five Associate Fellows, George Brown Goode, Atticus Green Haygood, Matthew Carey Lea, Henry Newell Martin, and Hubert Anson Newton; and nine Foreign Honorary Members, Heinrich Ernst Beyrich, Ernst Curtius, Emil Heinrich Du-Bois Reymond, Hugo Glydén, Friedrich August Kekulé, Baron Ferdinand von Mueller, Jules Simon, James Joseph Sylvester, and Karl Weierstrass.

FRANCIS JAMES CHILD.

FRANCIS JAMES CHILD was born in Boston, on the 1st of February, 1825. His father was a sailmaker, one of that class of intelligent and independent mechanics which has had a large share in determining the character of our democratic community, as of old the same class had in Athens and in Florence. The boy was the youngest of five brothers and sisters. He was sent to the public schools. His unusual capacities were early displayed. He stood first in his classes, and was a favorite with his schoolfellows. At the English High School he won all the prizes, and having by chance attracted the attention of our venerable fellow citizen, Mr. Epes S. Dixwell, then the Master of the Latin School, his father was induced, at Mr. Dixwell's suggestion, to allow him to proceed to the Latin School, that he might continue his studies and be prepared for entrance to college. He speedily caught up with the boys who had already made progress in the study of Greek and Latin, and soon took the first place here, as he had done in the schools which he had previously attended. The sweetness of his disposition, the pleasant mingling in his nature of gay spirits and serious purpose, his high principles, his unaffected modesty won the affection of his teachers and of his comrades. His superiority in

his classes was so unmingled with pretension or conceit, that it was admitted without question or envy. Mr. Dixwell became strongly attached to him, and, in view of the great promise of his talents and his character, secured the means for his support in college, which he entered in the autumn of 1842.* Harvard was then still a comparatively small institution, with no claims to the title of University; but she had her traditions of good learning as an inspiration for the studious youth, and still better she had teachers who were examples of devotion to intellectual pursuits, and who cared for those ends the attainment of which makes life worth living. Josiah Quincy was approaching the close of his term of service as President of the College, and stood before the eyes of the students as the type of a great public servant, embodying the spirit of patriotism, of integrity, and of fidelity in the discharge of whatever duty he might be called to perform. Among the Professors were Walker, Felton, Peirce, Channing, Beck, and Longfellow, men of utmost variety of temperament, but each an instructor who secured the respect no less than the gratitude of his pupils.

The Class to which Child belonged numbered hardly over sixty. The prescribed course of study which was then the rule brought all the members of the Class together in recitations and lectures, and every man soon knew the relative standing of each of his fellows. Child at once took the lead and kept it. His excellence was not confined to any one special branch of study, he was equally superior in all. He was the best in the classics, he was Peirce's favorite in mathematics, he wrote better English than any of his classmates. His intellectual interests were wider than theirs, he was a great reader and his tastes in reading were mature. He read for amusement as well as for learning, but he did not waste his time or dissipate his mental energies over worthless or pernicious books. He made good use of the social no less than of the intellectual opportunities which college life affords, and became as great a favorite with his classmates as he had been with his schoolfellows.

The close of his college course was marked by the exceptional distinction of his being chosen by his classmates as their Orator, and by his having the first part at Commencement as the highest scholar in the Class. His Class Oration was remarkable for its maturity of thought and of style. Its manliness of spirit, its simple directness of presentation

* The pecuniary debt thus incurred was afterwards paid with interest. But though only thus could Mr. Child's spirit of independence be satisfied, he cherished through life the most grateful affection for the friend who had thus served him.

of the true objects of life, and of the motives by which the educated man, whatever might be his chosen career, should be inspired, together with the serious and eloquent earnestness with which it was delivered, gave to his discourse peculiar impressiveness and effect.*

Immediately upon his graduation he was appointed Tutor in the College, with duties of instruction in English. To the study of the English language and literature he was led by taste, and his knowledge was already considerable in this wide field, to the cultivation of which the remainder of his life was to be in great part devoted, and in which he was to become an acknowledged master. In 1848 he published his first work, an edition in one volume of "Four Old Plays," all of the sixteenth century, and of interest to the student of the development of the English drama as exhibiting its conditions immediately before its splendid manifestation in the works of the Elizabethan playwrights. Nothing of the kind had been done previously in America. The volume appealed to but a small class of readers, but, with those who were competent to judge of it, it established the reputation of its editor as a scholar of more than usual competence of learning and sobriety of judgment.

In 1851, on the resignation of Professor Channing as Boylston Professor of Rhetoric, Child was appointed his successor with leave of absence for study in Europe, before assuming the duties of the position. The opportunities which Europe then afforded to the young American scholar were diligently made use of. He obtained the degree of Doctor of Philosophy at Göttingen in 1854, and in the autumn of the same year he returned to his work at Harvard. A great part of his time was employed in the teaching of English composition, and the drudgery of correcting students' exercises, but he had an indefatigable industry and a steady ardor of learning, and he found time to carry on his own special studies. He undertook the general superintendence of a series of the works of the chief British Poets, and himself prepared for it the edition of Spencer (1855) in five volumes, which for the use of the general reader still remains the best. For the same series he compiled a Collection of Ballads in eight volumes, published in 1857–58, which in extent of range, in judgment in selection, and in thoroughness of literary and historical illustration, was far superior to any preceding similar

* An eminent living graduate of Harvard, who was present on the occasion, having come to Cambridge to take his entrance examination, has said that he received from that oration his first vivid sense of the dignity of intellectual pursuits, and his first strong impulse to devote himself to them.

work. But a more important piece of work, one of original investigation and displaying "wonderful industry, acuteness, and accuracy," * was the treatise issued in the Memoirs of our Academy in 1862 under the modest title of "Observations on the Language of Chaucer," † which was followed in 1868 by a Supplement, entitled "Observations on the Language of Gower's Confessio Amantis." ‡ "It is difficult at the present day," says Professor Kittredge, "to imagine the state of Chaucer philology at the moment when this paper appeared. Scarcely anything, we may say, was known of Chaucer's grammar and metre in a sure and scientific way. Indeed, the difficulties to be solved had not even been clearly formulated. . . . Mr. Child not only defined the problems, but provided for most of them a solution which the researches of younger scholars have only served to substantiate. He also gave a perfect model of the method proper to such investigations, — a method simple, laborious, and exact." §

For many years after this Mr. Child published little, but with steady purpose devoted such leisure as his incessant professional task allowed to the extension of the vast stores of his learning, and to the accumulation of the material for the main work of his life, a complete critical edition of "The English and Scottish Ballads." At length in 1882 appeared the first part of his work. The character of the undertaking was set forth in a prospectus. The popular Ballads existing in the English language had never been collected into one body; a large portion of the remains of the ballads was unprinted; the text of much that was in print was vitiated by editorial changes; it was now proposed to publish all in their entirety and their purity; to include every independent version of every ballad, and to record all important variations of different copies, both printed and manuscript; each ballad was to have a proper Preface, and in the case of those ballads which the English have in common with other nations an account was to be given of related traditions. The work was to be completed by a general introduction, a glossary, and indexes. The vast scale of this matured design became obvious on the publication of the first part. The large range of the themes of the ballads, the immense variety of local, historical, and romantic tradition

* These are the terms used by Mr. A. J. Ellis, the learned author of the History of English Pronunciation.

† Memoirs of the American Academy, New Series, Vol. VIII. pp. 445–502.

‡ Ibid., Vol. IX. pp. 265–315.

§ From the admirable appreciation of Professor Child's character and works in the Atlantic Monthly for December, 1896.

exhibited by them, the wide diffusion among the nations of Europe of the legends which many of them embodied, opened a field of investigation of enormous extent, requiring acquaintance alike with many languages and many literatures. The task was one with which only a scholar possessed of exceptional acquisitions could hope to accomplish satisfactorily, and from which even the most industrious might have shrunk. It had hardly a parallel in the variety of learning which it exacted for its due performance, but this was not all; it demanded in no less measure fine critical acumen and poetic appreciation, — the gifts of taste and culture as well as of scholarship. Mr. Child possessed them all.

"It was my wish," he said, in the Advertisement prefixed to the first part, "not to begin to print The English and Scottish Popular Ballads, until this unrestricted title should be justified by my having at command every valuable copy of every known ballad. . . . What is still lacking is believed to bear no great proportion to what is in hand. . . . Meanwhile the uncertainties of the world forbid a longer delay to publish so much as has been got together."

From year to year the parts followed in rapid succession, — rapid in view of the character of the work, — and in the Advertisement to Part IX., which appeared in the spring of 1894, Mr. Child had the satisfaction of saying that, to the extent of his knowledge of sources the collection was complete, with the exception of a single ballad, "which is probably a variety of one or another here given in several forms." Such had been the extraordinary success of his research, in which he had been aided by many English and foreign scholars glad to assist in the perfecting of a work which was of interest to them in itself, and which roused their admiration by the manner in which it was executed.

The body of the work was complete; but one more part was needed, to contain a general Introduction, a Glossary, and Indexes. In spite of failing health Mr. Child set himself resolutely to the drudgery involved in this task. To the last month of his life he labored steadily, but with a sense of weariness to which he had been unused. With the exception of the Introduction the task was mainly accomplished, and the work was left in such condition that it could be taken up and carried through by the most competent hands next to Mr. Child's own, those of his disciple, assistant, and friend, Professor Kittredge.

The year 1895–96 completed the fiftieth year of Mr. Child's service in the University. It was a matter of satisfaction to him that during its course he had been able, in spite of physical infirmity, to meet his classes without the omission of a single lecture. The College year ended in

June. He took no vacation, but busied himself in his study, and found pleasure in his garden of roses. In August he became seriously ill, and on the 11th of September he died.

Mr. Child's fame as a scholar is secure. His work is so done that it can never be superseded. But to those who had the happiness of intimacy with him, his learning and all that he accomplished seem but as secondary and accessory to the essential qualities of his character and his manner of life. The sedentary nature of his occupations, and their narrow material confines within the limits of a University helped to preserve the strongly marked and altogether delightful originality of his nature from the pressure and attrition of the world, which speedily wear down the marks of distinctive individuality and shape the mass of men into a general dull uniformity. He had a most sympathetic and tender heart, so easily touched that its impulses might sometimes have overcome the restraint of good judgment, had they not been encountered by his keen, kindly, and lively humor, which, while it generally saved him from sentimental extravagances, yet became often the inciter and ally of his liberal sympathies. His charity might be abused, but his pity included even the most open of impostors, and, taking a humorous enjoyment in the success of deceits practiced upon himself, he chose rather to aid the undeserving than to let a single deserving needy man go by unhelped.

The same liberality of disposition was manifest in his relations to all whom he could assist in literary or scholarly work. He made a friend of every young scholar who sought from him advice or direction, and gave his time willingly to serve interests not his own. He could be merciless with pretenders, but he was marvellously patient with unpretending and innocent incompetence.

With the highest sense of the duties and the privileges of his calling, he did not regard them as exempting him from the discharge of the common duties of a citizen. He did not bury himself in his books, and he had nothing of the indifference of a recluse to the affairs of the community in which he lived. His feelings were strong and his judgment was sound in regard to the matters affecting public interests. His opinions carried weight, for they were based on principles and maintained with clear intelligence and ready wit. If roused by argument, no one was his match in the flash of wit and the play of humor. He took the part of a good citizen in local politics; he was for many years an active member and officer in local charities, and he served his term as a member of the School Committee. At the time of the civil war he threw himself with ardor into the service of the cause to which so many of the youth of Har-

vard, dear to him, were devoting themselves. He cherished with peculiar tenderness the memory of those who fell in the war. He was the main promoter of the two precious volumes of Harvard Memorial Biographies; and on the walls of his study, always before his eyes, close by the portraits of his old masters in learning, the brothers Jacob and Wilhelm Grimm, were those of his young heroic friends, the brothers Charles and James Lowell.

His fidelity in the discharge of the exacting duties of his professorship was complete. For far too many years far too much of his time was occupied in the correction of students' themes. He never shirked this wearisome drudgery. No teacher was ever more exacting of himself in the discharge of his regular duties. In the later years of his life, when he suffered much from gout and rheumatism, he did not allow pain or depression of spirits to interfere with the regular discharge of his task as instructor.

Even the dullest and most careless undergraduate could hardly fail to be quickened and improved by such teaching as Mr. Child's. Here was a master of most accurate and extensive learning, a scholar of unwearied diligence and exact method, with the faculties and sympathies which enabled him to impart his learning to his pupils, and to inspire in the more capable among them something of his own enthusiasm for the best in literature and life.

It is impossible not to regret that Mr. Child should not have done more independent literary work. The several introductions to the Ballads in his great collection, excellent as they are in their kind, very seldom afford him free space for the display of his own genius; but they abound in touches which light up the page with gleams of fancy or of humor, and more rarely with a flash of poetic imagination that reveals the restraint which the editor had imposed upon himself. His style when at freedom was of the best, — for it was the simple expression of the man himself.

Original, quaint, humorous, sweet, sympathetic, tender-hearted, faithful, — these are the terms which first come to mind in describing him; the traits that these terms imply included all his intelligence, gave character to his work, and made his learning the least part of him.

Those who knew him best think of him mainly as one who had the gift of love. He was a lover of nature, of poetry, of roses, of all that was fair and sweet and good; above all he was a lover of his fellow men. When he died the world lost much more than one of its great scholars.

C. E. Norton.

THOMAS TRACY BOUVÉ.

THOMAS TRACY BOUVÉ, Resident Fellow of the Academy, was born on Prince Street, in Boston, January 14, 1815, and died in the city of his birth, June 3, 1896. He was of Huguenot descent. His parents were Ephraim Osborn and Lydia (Tracy) Bouvé, and his paternal grandfather was Jonathan Bouvé, a soldier of the Revolution. In 1839 he married Emily G. Lincoln; and his wife and five children survive him.

Very early in life he attended a private school; at the age of seven years he entered the Eliot public school, received the Franklin medal when twelve years of age, and then entered the English High School. It being necessary for him to do something for self-support, he left the school and entered a dry goods store. At fifteen he entered the service of an iron manufacturing company, where he became bookkeeper and chief accountant; later, he entered the office of the Hamilton, Appleton, and Lowell Manufacturing Companies to take charge of the books of these respective companies, and he also kept the books of the Great Falls Manufacturing Company. When about twenty-six years of age, Mr. Bouvé became a partner in a commission iron house, remaining in the business thirty years; and in 1870 he became treasurer of the Glendon Iron Company, retaining this office until his death.

Although his life was thus burdened to the end with the cares and responsibilities of a successful business career, they could not fetter his mind or stifle his interest in more distinctly intellectual pursuits. After leaving school he devoted much time to the study of chemistry, French, and Latin, and received the degree of A. M. from Harvard University in 1850. But the great central fact of Mr. Bouvé's life was his deep and abiding love of nature. This was manifested at a very early age, and throughout his long and busy life he was an ardent and steadfast student of natural history. His lifelong friend and associate, Dr. James C. White, justly describes him as a fine example of the amateur naturalist, and what this class has done for the advancement of science in this country.

Mr. Bouvé was only fifteen years old when the Boston Society of Natural History was founded. Four years later he became a member of the Society; and his labors in its behalf extended over more than threescore years, the period of his membership being the longest in its history. In fact, it was in connection with the Boston Society of Natural History, and especially in the building up of its collections, that his interest in natural history was chiefly manifested.

After serving the Society efficiently in almost every subordinate capacity, he was, in 1870, elevated to the presidency. The success of his administration is attested by the spontaneous and earnest expressions of regret when, in 1876, he desired to resign his high office. At the meeting prior to the annual election, to use his own words, "What was read as a valedictory was listened to with great attention, after which a call to proceed to the business of the meeting was made. Instead of responding to this call, one after another of those whom the writer most respected addressed him in such terms of affectionate remonstrance against his resignation, as to induce him not only to withdraw it, but to feel that henceforth what had been regarded as a burden would be a joy, that the performance of the duties of his office would be sweetened as never before by the recognition that the respect and regard which he felt towards all the members were fully reciprocated by them." In 1880, on the completion of the fiftieth year of the society, and his tenth year as president, he declined re-election. But he performed no greater service to the Society or science than is represented by the admirable history of the Society's first half-century contributed in this year to its memorial volume. We search in vain, however, through this painstaking record, for any adequate account of his own labors. Nevertheless, although belonging to a later generation, I have had abundant opportunity to learn with what rare zeal and fidelity he served the Society; and I feel justified in stating that its extensive and efficient collections of minerals, rocks, and fossils were in a large measure created by him. It was throughout evidently a labor of love on his part; and that fact alone can explain how he was able to find in these busiest years of his life the great amount of time which this work must have required. Nor did his devotion to these departments cease with his accession to the presidency. It was my privilege, during the greater part of the decade when he was at the head of the Society's affairs, to work with him or under his direction in the care of these collections; and I can, therefore, speak from intimate personal knowledge of his methods. What most strongly impressed me were his affectionate regard for the specimens, and his absolute conscientiousness in every detail of the work. I often recall with much profit his painstaking investigations of individual specimens. He spared no pains to remove the last modicum of doubt as to the authenticity of species, variety, locality, composition, or formation, nor hesitated to use the query mark when the desired result could not be attained. Working in this methodical manner, progress could not be rapid when measured by hours. But what was done was well done; and he came

again the next day and the next, for half an hour or an hour in the morning and as long as daylight lasted in the afternoon, making this work, which he loved so well and called his recreation, a part of his daily routine. Thus month by month, without haste or faltering, important and enduring results were accomplished.

Although specially interested, as his published papers and the records show, in several branches of natural history, Mr. Bouvé's first love among the natural sciences was mineralogy. In the mineralogical annals of the Society three names are especially prominent, — Francis Alger, Charles T. Jackson, and Thomas T. Bouvé. These three men were contemporaries and lifelong friends; and each in his own way contributed in an important degree to the development of this department of the Museum. Mr. Bouvé was the youngest of the trio, and the period of his activity extended well into the modern era in the history of educational methods. He was thus led to a deeper appreciation of the value of minerals as a factor in elementary education. It is therefore probably well within bounds to say, that for this reason, and because of his greater length of service, Mr. Bouvé has done more than any other one man to make this collection what it is to-day, an important adjunct of the educational system of the community.

During the years when we worked together upon the minerals, I had the pleasure of hearing from his lips the history, both in general and in detail, of a large part of the collection; and whether the specimens had been collected by himself or a fellow member, or obtained by purchase or exchange, his evident love for them made me feel that I was being introduced to his dear friends, whose care he was reluctant to relinquish to another.

His appreciation of the beautiful in minerals culminated in his well known fondness for gems; and these he did not value commercially, but only in proportion to their intrinsic beauty and scientific interest. This study forced upon his attention the unsatisfactory nature of the criteria, such as color and lustre, commonly relied upon in the identification of cut stones; and led him to test more thoroughly than had been done before the relatively fundamental property of specific gravity. In his valuable paper on this subject he demonstrated to the satisfaction of Professor Dana, and other high authorities, that while each of the mineral species to which the gems belong varies notably in specific gravity, so that the several species overlap and are indistinguishable by this character, the gems, being in every instance the purest and most ideal forms of their respective species, are essentially constant, and only rarely so

nearly of the same density as not to be readily and certainly distinguished by careful weighing.

Mr. Bouvé's later contributions to scientific literature relate chiefly to the geology of the Boston Basin, and especially of the South Shore. These papers include: (1.) "The Genesis of the Boston Basin and its Rock Formations," in which for the first time the importance of the antecedent chemical decay of the older rocks in explaining the origin of the conglomerates and slates is adequately recognized. (2.) "The Indian Potholes or Giant's Kettles of Foreign Writers," a carefully illustrated and in every way admirable account of the most interesting group of glacial potholes yet discovered in this region. (3.) The chapter on the geology of Hingham, prepared for the town history. This was by far his most important study, and it was my good fortune to be intimately associated with him in this work, which extended over a period of half a dozen years.

I have never found field-work more enjoyable or profitable; and, as in the Museum, I was deeply impressed by Mr. Bouvé's unselfish singleness of purpose, his high appreciation of the educational value of the local geology, and his painstaking thoroughness. He labored, not for fame, but for the advancement of the community in which he lived. He never counted time or strength while there seemed to be any possibility of verifying a fact or testing a conclusion; and in this contribution to the town history he realized in gratifying measure his ideal, which was not merely to set forth the geologic structure of the town, but to show his fellow townspeople that in its geological history Hingham is in a large degree an epitome of the world, and that within the narrow limits of the town are presented problems as stupendous and full of interest as any that have ever engaged the attention of geologists.

The part of this work relating to the surface geology or drift phenomena was subsequently amplified and published as a separate paper in in the Proceedings of the Natural History Society. Not content with giving to Hingham and the world the intellectual results of his labors, Mr. Bouvé placed in the town library, as an additional stimulus to interest in the local geology, a well selected and carefully labelled series of the Hingham rocks. To these he subsequently added the main part of his extensive collection of minerals. The arrangement and labelling of this generous gift to the town, almost his last public work, was frequently interrupted by his failing health; and he experienced no little satisfaction in not being obliged to leave it unfinished.

Nothing connected with his work on the geology of the South Shore

has afforded the writer more pleasure than the privilege, in association with Mr. A. W. Grabau, of giving the name of our friend to the glacial lake which once adorned that region, and was a controlling factor in the development of the surface geology. Mr. Bouvé lived long enough to note the general and cordial acceptance of this name; and I venture to hope that it may long endure as a fitting memorial of this earliest and most devoted student of the geology of the district which embraces Lake Bouvé.

W. O. Crosby.

FRANCIS AMASA WALKER.

Francis Amasa Walker, late President of the Massachusetts Institute of Technology, and a Fellow of this Academy from October, 1882, was born in Boston, July 2, 1840, and died of apoplexy in that city, January 5, 1897.

His father, the late Amasa Walker of North Brookfield, was a well known figure in the political life of Massachusetts for many years. He was a leader in the Free Soil movement of 1848, and in the subsequently combined opposition to the Whig party. He served in each branch of the Legislature, was for two years Secretary of the Commonwealth, was a Presidential Elector in 1860, and a member of the lower House of Congress for the session of 1862–63. From 1842 to 1848 he lectured on political economy in Oberlin College, and was afterwards a frequent writer for periodicals, especially upon topics connected with finance and banking, in which he also showed special interest when in Congress. From 1859 to 1869 he was Lecturer upon Political Economy in Amherst College, publishing during that time his well known book, the "Science of Wealth," and died in 1875.

Francis Amasa Walker, the son, thus grew up with an inherited predilection and aptitude for economic study, strengthened by the associations of boyhood and youth. When he graduated from Amherst College in 1860, however, his first step was to enter as a student of law the office of Charles Devens and George F. Hoar of Worcester, — both gentlemen destined, like himself, soon to attain national reputation. On the breaking out of the Civil War in 1861, Mr. Devens at first took the field as an officer of militia, and, when later he raised the Fifteenth Regiment of Massachusetts Infantry in Worcester County, young Walker enlisted and was mustered into the service as Sergeant Major, August 1, 1861. Ten days later, he was commissioned and assigned to the staff of

General Couch. From that time he was upon duty with the Army of the Potomac, serving with advancing rank upon the staff of Generals Warren and Hancock through some of the severest campaigns of the war. He resigned his commission in January, 1865, from illness contracted while a prisoner within the Confederate lines, received the brevet rank of Brigadier General "for distinguished service and good conduct," and returned to civil life bearing the honorable scars of the brave. It afterwards fell to his lot, in his "History of the Second Army Corps" (1886), and his "Life of General Hancock" (1894), to write the narrative of events no small part of which had passed before his eyes. Little of his own history is to be found in those glowing pages, but every line bears witness to the intense enthusiasm with which he never failed to kindle when he recalled his army life, and to his devotion to the great captains under whom he served.

Like many other young men, who, as soldiers in the War for the Union, drank the wine of life early, General Walker came home with his character matured, his capacities developed, his intellectual forces aroused and trained, — a man older than his years. The career in which he was to win new distinction did not open for him at once upon the sudden return of peace. For three years he was a teacher of the classics in Williston Seminary, and in 1868, being compelled by an attack of quinsy to seek a change of occupation, he became an assistant of Mr. Samuel Bowles, editor of the Springfield Republican. From this place he was drawn into the public service at Washington, by the agency of Mr. David A. Wells, who was then Special Commissioner of the Revenue, and in search of a new Chief for the Bureau of Statistics. The work of the Bureau had fallen into some discredit, and was far in arrears, and the inability of the former Chief of the Bureau to command the confidence of Congress seriously embarrassed the continuance of an important work. By Mr. Wells's advice General Walker was made Deputy Special Commissioner and placed in charge of the Bureau, and a new career was at once opened before him, for which he was fitted in a peculiar manner both by his intellectual interests and his administrative capacity. The Bureau was reorganized and its reputation was regained. The monthly publications were resumed, and soon showed that progressive improvement which has made them one of the most valuable repositories in existence for the study of the commercial and financial activity of a great country.

From his appointment to the charge of the Bureau of Statistics the steps in General Walker's new career followed in rapid succession. In 1870 he was appointed Superintendent of the Ninth Census of the

United States; in 1871 he was appointed Commissioner of Indian Affairs; in 1872 he was made Professor of Political Economy and History in the Sheffield Scientific School of Yale College; in 1876 he was Chief of the Bureau of Awards for the Centennial Exposition in Philadelphia; in 1878 he was sent as a Commissioner for the United States to the International Monetary Conference at Paris; in 1879 he was appointed Superintendent of the Tenth Census of the United States; in 1881 he was made President of the Massachusetts Institute of Technology; in 1882 he was elected President of the American Statistical Association; in 1885 he was elected first President of the American Economic Association; in 1891 he was elected Vice-President of the National Academy of Sciences; in 1893 he was President-adjunct of the International Statistical Institute, at its session in Chicago.

General Walker's successive appointments as Superintendent of the Census of 1870 and of that of 1880 were the direct result of the energy and skill with which, during the months of his service in the Bureau of Statistics, he had effected the reorganization of that office and its work. The opportunities given to him as a statistician, by having charge of these two censuses, were of a remarkable kind. The census of 1870, being the first taken after the Civil War, was for that reason by far the most interesting and important since 1790. It was to show the social and economic changes wrought by four years of prodigal expenditure both of life and of resources, and by the unparalleled revolution in the industrial organization of the former slave States. It was also to ascertain and record the conditions under which the nation entered upon a new and wonderful stage of its material growth. The census of 1880 was the unique occasion for what General Walker designed as a "grand monumental exhibit of the resources, the industries, and the social state of the American people,' made approximately at the close of a century of national independence.

The Census of 1870, to the great regret of all who had any scientific interest in the subject, was left by Congress to be taken under the provisions of the Census Act of 1850, by persons neither selected nor controlled by the Census Office. In the still disturbed condition of some of the Southern States, the work was thus thrown into the hands of men notoriously unfit for such employment, and the returns, especially of the black population, were vitiated at their source. In his Report of 1872, and in his Introduction to the "Compendium of the Census of 1880," General Walker described in strong language the difficulties which thus beset the work in 1870; and again in the Publications of the American Statistical Association for December, 1890, writing upon the "Statistics of the

Colored Race in the United States," he used his freedom from official relations in exposing the mischief done by legislative failure to provide intelligently for an important public service. As a whole, however, the Census of 1870 was the best and the most varied in its scope that had yet been obtained for the United States. It was, after all, a signal proof of what can be done by a competent head, even with imperfect legislation, and established the reputation of the Superintendent as an administrative officer, at the same time that his fresh and vigorous discussion of results secured him high rank among statistical writers. Great interest was excited, moreover, by the remarkable use made of the graphic method in presenting the leading results of this census, in his "Statistical Atlas of the United States" (1874).

The Act providing for the Census of 1880 was greatly modified, by General Walker's advice, and the working force was for the first time organized upon an intelligent system, by the employment of specially selected enumerators in place of the subordinates of the United States marshals, to whom the law had previously intrusted the collection of returns. Highly qualified experts were also employed for the historical and descriptive treatment of different industries and interests, as demanded by the monumental character of the centennial census. Various causes delayed the completion of this gigantic undertaking. Those to whom a census is merely a compendious statement of passing facts became impatient at the slow issue of the twenty-two stately quartos, and complained that the work was on such a scale as to be obsolescent before its appearance. General Walker, in an article in the Quarterly Journal of Economics for April, 1888, explained some of the special causes of the delay in publication and took upon himself perhaps an undue share of responsibility for the difficulties caused by an original underestimate of the total cost of the census. But notwithstanding its misfortunes, the Census of 1880 is a great work of enduring value and not excessive cost, — great in its breadth of design, worthy of the nation and of the epoch, and a lasting monument of the power of its Superintendent to conceive and to execute. Following the Census of 1870, it won for him universal recognition as one of the leading statisticians of his time.

In the article to which reference has just been made, General Walker, in his discussion of future arrangements for the national census, offered as the fruits of his own experience some valuable suggestions, which deserve more attention than they have yet received. It is hardly necessary, however, to enter upon them here, except to recall the fact that he advised the organization of the Census Office as a permanent establish-

ment, in order to secure the improved service and economy of a trained force of moderate size, constantly employed. Upon an office thus organized could be laid, at the regular intervals, the duty of collecting and preparing the returns of population and of agriculture for the decennial census required by the Constitution, and perhaps for an intermediate fifth year enumeration, and also in the intervals the systematic prosecution of other statistical investigations, to be charged upon the office from time to time as occasion might require.

General Walker's appointment as Professor in the Sheffield Scientific School, in 1872, carried him beyond the boundary of statistics into the general field of political economy. His training for this extended range of work, although obtained by a less systematic process than is now usual, had begun early, and as opportunity offered was carried on effectively. In one of his prefaces, he remarks that he began writing for the press upon money in 1858, probably having in mind a series of letters to the National Era of Washington, beginning soon after the crisis of 1857, and continued for some months, noticeable for sharply defined views on the subjects of banking and currency, and also as to the merits of Mr. Henry C. Carey as an economist. In 1865, before going to Williston Seminary, he lectured upon political economy for a short time at Amherst in his father's absence, and in 1866 his father recognized with pride his important assistance in finishing the "Science of Wealth." From the close of the war, he is otherwise known to have been a keen student of economics, although a student under such limitations and so hampered by pressing occupations as to make it difficult for him to do equal justice to all parts of his outfit. It was perhaps from this cause, in part, that his earliest important publications as an economist were two treatises on widely separated topics, "The Wages Question" and "Money."

The earlier of these two books, "The Wages Question" (1876), instantly attracted the attention both of economists and of the general public by its lively and strong discussion of the central topic of the day, then more commonly treated either as a matter of dry theory, or as a problem to be settled by sentiment. Following Longe and Thornton, the author made an unsparing attack upon the wages fund theory, and, arguing that wages are paid from the product of labor and not from accumulated capital, he set forth with great vigor the influences which affect the competition between laborer and employer in the division of this product. General Walker's earliest public statement of his now familiar opinions touching the wages fund, and the payment of wages from the product, was made, it is believed, in an address delivered before the literary societies

of Amherst College, July 8, 1874, and he further developed the subject in an article contributed to the North American Review for January, 1875. Few books in political economy have taken a place in the foreground of scientific discussion more quickly than "The Wages Question." Many economists followed the author's lead with little delay, and those who were slower to admit that the object of his attack was in fact the wages fund of the older school, recognized his assault as by far the most serious yet made. Unquestionably it compelled an immediate review of a large body of thought by the great mass of economic students in the English speaking countries.

In "The Wages Question," General Walker drew the line clearly between the function of the capitalist and that of the employer, or *entrepreneur*, and between interest, which is the return made to the former, and profits, which are the reward of the latter. It was however in his "Political Economy" (1883), that he worked out his theory of the source of business profits and of the law governing the returns secured by the employing class. This enabled him to lay down a general theory of distribution, to be substituted for that associated with the wages fund theory, which he regarded as completely exploded, and indeed "exanimate." Of the four parties to the distribution of the product of industry, three, the owner of land, the capitalist, and the employer, in his view, receive shares which are determined, respectively, by the law of Ricardo, by the prevailing rate of interest, and by a law of business profits analogous to the law of rent. These shares being settled, each by a limiting principle of its own, labor becomes the "residual claimant," be the residue more or less, and any increase of product resulting from the energy, economy, or care of the laborors "goes to them by purely natural laws, provided only competition be full and free." So too the gains from invention enure to their benefit, except so far as the law may interfere by creating a monopoly. This striking solution of the chief problem of economics attracted wide attention, and was further expounded and defended by its author in the discussions which it provoked, as may be seen by reference to the earlier volumes of the Quarterly Journal of Economics. Indeed, in his last published work, "International Bimetallism" (page 283), he prefaces a statement of his theory by saying, "I have given no small part of my strength during the past twenty years to the advocacy of that economic view which makes the laborer the residual claimant upon the product of industry."

General Walker published his treatise, "Money" (1878), at a moment singularly opportune for the usefulness of the book and the ad-

vancing reputation of its author. Public opinion in the United States was in extreme confusion on the questions involved in the return to specie payment; there was a formidable agitation for the repeal of the Resumption Act, and Congress was entering upon its long series of efforts to rehabilitate silver as a money metal. At this juncture, when every part of the theory of money was the subject of warm discussion, scientific and popular alike, General Walker, using the substance of a course of lectures delivered by him in the Johns Hopkins University in 1877, laid before the public an elaborate and broad-minded survey of the whole field, claiming little originality for his work, but giving material help in concentrating upon scientific lines a discussion which was wandering in endless vagaries. On the general subject his views had no doubt been formed early, under the influence of his father, to whom, in more than one passage of this book, he makes touching allusion, and later in life he found in them little to change, although the long *régime* of paper money and its consequences suggested many things to be added. In 1879 he published, under the title of "Money in its Relations to Trade and Industry," what was in some sense an abridgment of the larger work, made for use in a course of lectures in the Lowell Institute; and in his "Political Economy" he again condensed his arguments and conclusions as to money, as part of his discussion of the grand division, Exchange.

When the International Monetary Conference met in 1878, by invitation of the United States, General Walker went to Paris as one of the commissioners for this country. His discussion of bimetallism had not been carried in "Money" much beyond a careful statement of the question and of the arguments on each side, but it was carried far enough to show that international bimetallism, and not the simple remonetization of silver by the United States, was, in his view, the proper method of securing what he deemed an adequate supply of money for this country and for the commercial world. Great emphasis was laid, in "Money, Trade, and Industry," upon the necessity for "concerted action by the civilized states," and this ground was consistently held by him until his share in the discussion ended with the publication of "International Bimetallism" (1896), a few months before his death. In this book, which was the outcome of a course of lectures delivered in Harvard University, after reviewing the controversy over silver, which had more and more engaged his attention as time went on, he declared more vigorously than ever his opinion of the futility of the policy of solitary action, adopted by the United States in the Act of 1878. "International Bimetallism"

appeared in the midst of a heated Presidential canvass, in which the issues had taken such form that some, who like himself were supporters of "sound money," found a jarring note in what they regarded as needless concessions to "free silver," and in the sharp phrase in which his ardor and deep conviction sometimes found expression. But the book was not written for effect upon an election; it was the last stroke of a soldier, in a world-wide battle, — soon to lay aside his arms.

It was General Walker's good fortune to enter the field as an economist when the study of economics was gaining new strength in the United States from the powerful stimulus of the Civil War, and of the period of rapid material development and change which followed. The revision of all accepted theories which set in did not displease him, and he took his share in the ensuing controversies, whether raised by himself or others, with equal zest. His own tendency, however, was towards a rational conservatism, and his modes of thought never ceased to show the influence of writers, French and English, of whom he appeared to the superficial observer to be the severe critic. "A Ricardian of the Ricardians" he styled himself in his Harvard lectures on land, published under the title of "Land and its Rent" (1883). His theory of distribution, if enunciated by one of narrower sympathies than himself, might have been thought to be designed as a justification of the existing order of things. In his monetary discussions he contended for a return to what he deemed the safe ways of the past. As for his view of the future, in a public address in 1890, after a remarkable passage describing the sea of agitation and debate which had submerged the entire domain of economics, and threatened to sweep away every landmark of accepted belief, he said, "I have little doubt that in due time, when these angry floods subside, the green land will emerge, fairer and richer for the inundation, but not greatly altered in aspect or in shape."

The election of General Walker as the first President of the American Economic Association, in recognition of his acknowledged eminence, deserves a passing notice at this point. The Association was organized at Saratoga in 1885, under circumstances which threatened to make it the representative of a school of economists rather than of the great body of economic students in America, and with a dangerous approach to something like a scientific creed. General Walker cannot be said to have represented any particular school. He was both theorist and observer, the framer of a theory of distribution, and also an industrious student of past and current history. By a happy choice the new Association strengthened its claim upon public attention by electing him its

President, in his absence; and he wisely took his place at its head, with the conviction that its purposes were better than the statement made of them, and that the membership of the new organization gave promise of good results for economic science. Under his administration, which lasted until 1892, the basis of the Association was broadened, all appearance of any test of scientific faith disappeared, and American economists found themselves associated in catholic brotherhood. In part this change was no doubt due to the marked subsidence of the debate as to the deductive and the historical methods, but in part also it was due to the good judgment, personal influence, and perhaps in some instances the persuasive efforts of the President, who thus rendered no small service to economic science.

Which of General Walker's contributions to economic theory are likely to have lasting value, is a question not yet ready for decision. The subjects to which he specially devoted his efforts are still under discussion. His theory of distribution is not yet established as the true solution of the great problem; the wages fund has not yet ceased to be controversial matter; it is not yet settled whether the advocates or the opponents of bimetallism are to triumph in the great debate of this generation. But whether as a theoretical writer he is to hold his present place or to lose it, there can be no question as to the importance of his work, in imparting stimulus and the feeling of reality to all economic discussions in which he had a part. His varied experience and wide acquaintance with men had made him in a large sense a man of affairs. He watched the great movements of the world, not only in their broad relations, but as they concern individuals. He was apt to treat economic tendencies, therefore, not only in their abstract form, but also as facts making for the happiness or the injury of living men. Economic law was reasoned upon by him in much the same way as by others, but he never lost his vivid perception of the realities among which the law must work out its consequences. In his pages, therefore, theory seemed to many to be a more practical matter and nearer to actual life than it is made to appear by most economists. His words seemed to carry more authority, his illustrations to give more light, the whole science to become a lively exposition of the trend and the side movements of a world of passion and effort. A great English economist has said that Walker's explanation of the services rendered by the *entrepreneur* remind one of passages of Adam Smith. A great service has been rendered to the community by the writer who, in our day, has been able thus to command attention to political economy as a discussion belonging to the actual world.

General Walker's election to the Presidency of the Massachusetts Institute of Technology, in 1881, placed him at the head of an institution badly in need of a vigorous, confident, and many-sided administrator, for the development of its great possibilities. The plan on which it should work had been prepared and its foundations laid broad and deep by President Rogers, but the work itself was still languishing, endowment and equipment were scanty, and the number of students declining. General Walker's administration was signalized by a sudden revival of the school. Funds were secured, new buildings were built, the confidence of the public won, and at General Walker's death the school of barely two hundred students, still maintaining the severe standard of work set by its founder, had upon its register nearly twelve hundred students and maintained a staff of one hundred and thirty professors and instructors of different grades. Of the qualities as an educator and administrator of a great technical school displayed by General Walker in this brilliant part of his career, a striking description, made from close observation, has been given by Professor H. W. Tyler of the Faculty of the Institute, in the Educational Review for June, 1897.

There was doubtless much in the circumstances attending the foundation of the Institute of Technology which any disinterested friend of scientific education must now regret. But time has healed wounds and removed jealousies which divided a former generation, and none can now be found to question either the practical or the scientific value of the great institution conceived by Rogers, and brought to its present deserved eminence under the successor of whose day he lived to see little more than the dawn.

At no period of General Walker's life did he fail to take an active interest in the work of the community in which he lived. That he was already charged with great responsibilities was a reason, both with his fellow citizens and with himself, for increasing the load. An early instance of this was his service as Commissioner of Indian Affairs for one year while still in charge of the census of 1870, — a service marked by an annual report remarkable for its thorough review of the whole subject, and by the appearance of his book, "The Indian Question" (1874). At different times, in New Haven and in Boston, he was a member of the local School Board and of the State Board of Education. He was a Trustee of the Boston Public Library and of the Museum of Fine Arts, one of the Boston Park Commissioners, and an almost prescriptive member of any more temporary board or committee. In some of these capacities his labors have left their traces in his written works,

in others his name gave weight to organizations in which he was not called upon for active effort. The number and variety of the appointments thus showered upon him marked not only the unbounded range of his own interests, but the confidence of others that every appeal to public spirit would stir his heart.

The bibliography of his written work, prepared at the Institute of Technology and revised with great care since his death, will be found in the Publications of the American Statistical Society for June, 1897. It is a remarkable record of intellectual activity, maintained for nearly forty years, and resulting in a series of important contributions to the thought of his time, — a manifold claim to eminence in the world of science and letters.

A complete list of the honorary degrees and other marks of distinction conferred upon General Walker by public bodies, at home and abroad, cannot be undertaken here. It is enough to say that he was made Doctor of Laws by Amherst, Columbia, Dublin, Edinburgh, Harvard, St. Andrews, and Yale, and Doctor of Philosophy by Amherst and Halle; that he was a member, regular or honorary, of the National Academy of Sciences, the Philosophical Society of Washington, the Massachusetts Historical Society and this Academy, of the Royal Statistical Society of London, the Royal Statistical Society of Belgium, the Statistical Society of Paris, the French Institute, and the International Statistical Institute; and that he was an officer of the French Legion of Honor.

General Walker was endowed by nature with peculiar gifts for a career of distinction. In any company of men he instantly drew attention by his solid erect form and dignified presence, by his deep and glowing eye, and by his dark features, cheerful, often mirthful, always alive. His instant command of his intellectual resources gave him the confidence needed for a leading place, and his friendly bearing, strong judgment, and easy optimism made others welcome his leadership. His convictions were deep, and his opinions, once formed, were shaken with difficulty, for in discussion he had the soldier's quality of not knowing when he is beaten. His ambition was strong, and he liked to feel the current of sympathy and approval bearing him on, but he did not shrink from his course if others refused to follow. From first to last, he grappled with large undertakings and large subjects, conscious of powers which promised him the mastery. Such as his contemporaries saw him he will live for the future reader in many a sentence and page, — cheerful, courageous, hopeful.

CHARLES F. DUNBAR.

BENJAMIN APTHORP GOULD.

BENJAMIN APTHORP GOULD was born on September 27, 1824, at No. 5 Winthrop Place, Boston. The years of his preparatory education were passed at the Chauncy Hall and Boston Latin Schools. He graduated from Harvard College in 1844. It is interesting to note, as evidence of his wonderful versatility of mind, and in view of the subsequent choice of a career which has made his name so illustrious in the annals of science, that, although he attained in college high distinction in mathematical and physical branches, the earliest studies of his predilection were classical rather than scientific. After leaving college he took charge of the Boston Latin School. At the end of a year, however, his intellectual energies took their final direction towards science. What were the springs of the influence which turned him to astronomy, and how long the impulse had been gathering force, cannot now be told, but the passionate devotion with which he entered upon this career, and the tenacity with which he held to it, — at times under circumstances of extreme discouragement which never caused him to falter or swerve from his purpose, — are characteristic of the man. This initial decision of a young man of twenty-one, as we look back upon it from a point where we can measure the results that have flowed from it, seems not so much an episode in an individual career as an epoch in our national scientific history. For the date, July, 1845, when Gould placed his foot upon the steamer from Boston, with the avowed and definite purpose to devote himself to a life purely of scientific research, marks quite distinctly a most important phase in American astronomy. Up to that time the instance of a man doing this as his only earthly aim, while unassured of a professor's chair or other similar appointment, and not as a means of livelihood, was in this country absolutely unknown. With a steadiness of purpose singular in so young a man, he pursued diligently the opportunity he had himself created, for three years at the fountain-heads of astronomical learning. Beginning his life of preparation, study, and work with Airy at Greenwich, he then went to Paris. But it was afterwards, in Germany, that he secured his true education in the regenerated methods of modern astronomical research; at Berlin, where he spent a year with Encke; at Altona, Pulkowa, and Gotha, under Peters, Struve, and Hansen; and at Göttingen, where for a year he was a pupil of Gauss, and where he took his Doctorate of Philosophy at the University in 1848. He then returned home, full of early honors and flushed with lofty hopes and honorable ambitions.

From this point Dr. Gould's life became one of incessant activity, impressing its mark in many ways upon the intellectual life of the community; but the line of intensest force naturally took the direction of his own beloved science, to which he communicated an impulse not measured merely by what he accomplished for it by his direct investigations, great as that is, but also by the force which always emanates from so earnest a nature. He inspired a new breath into American astronomy. The new atmosphere which he brought with him from Germany, where he had caught the spirit of the great masters under whom he studied, became gradually transfused upon this side the sea. His enthusiasm for the introduction of better means and methods of research was caught by his compatriots, their courage to regenerate our science was sustained, and transmitted through various channels to the next and to the present generation. Thus we may say without fear of being controverted that American astronomy to-day is a different thing from what it would have been without Gould's predominant influence, deep and quiet but strong, to upbuild it and to free it from the clumsiness and imperfections which still impede it, even in some of the otherwise most enlightened nations of the world. It is under his leadership that American astronomy has climbed to where it looks with steady and level eye upon that of Germany, which occupies perhaps a larger, but not a loftier plane.

Let us now glance at Dr. Gould's more prominent labors, passing by his earlier important investigations in applied theoretical and in practical astronomy, as well as his numerous and valuable contributions to the literature of science, education, and other departments of thought, which we find scattered through the long range of his career. In 1852 he was appointed to take charge of the longitude determinations of the Coast Survey. He organized, developed, and extended this service, retiring in 1867. Meanwhile, in 1855, he became director of the Dudley Observatory in Albany, equipped and organized the institution, and carried it on without remuneration and at his private expense. He left it in 1859, after a severe struggle to preserve the institution for purposes of scientific investigation.

In 1859 he published his discussion of the places and proper motions of circumpolar stars, for use as standards in the Coast Survey. These, as revised by him in 1861, together with his similar list of clock-stars, were adopted as the standards for the American Ephemeris, and, as to the circumpolars, remain in such use to this day. In 1866 he published his reduction of D'Agelet's observations. About the same time he performed a similar service for the greater part of the observations made at

the United States Naval Observatory since its establishment, as he had done also, several years previously, for the expedition to Chili to determine the solar parallax. In 1866 he planned and executed the work of establishing, by the Atlantic cable, the relation in longitude between European and American stations, involving, as a part, interesting researches on the velocity of the galvanic current in submarine cables, similar to those he had already made on land-lines. As actuary of the United States Sanitary Commission, he conducted, and published in a large volume, extensive and important researches upon Military and Anthropological Statistics and the Distribution of Population. About the same time he undertook the reduction of Rutherfurd's photographs of the Pleiades. The results, partially published in 1866, were submitted completely, in an elaborate memoir, to the National Academy in 1870, together with a second memoir on the Præsepe. He was, indeed, a pioneer in the utilization of photography for exact astronomical measurement. About 1864 he built an observatory in Cambridge, equipped with an eight-foot transit instrument, and, until 1867, carried on a determination of the right ascensions of all the stars to the tenth magnitude within one degree of the pole. The work was completely reduced, but the discussion and publication were postponed by his removal to Cordoba.

In 1865 he became intensely impressed with a desire to explore the southern celestial hemisphere. The opportunity to do so soon came. This project assumed at first the form of a private astronomical expedition, for which his friends in Boston had promised the pecuniary means; but, under the enthusiastic support of Mr. Sarmiento, at first as Argentine Minister to this country, and later as President of that republic, it rapidly broadened, and finally led to the establishment by Dr. Gould of a permanent National Observatory at Cordoba. This marks an epoch in modern astronomy, the equalization of our knowledge of the two celestial hemispheres. The institution and its work form an impressive monument to his memory.

It is impossible, in brief space, to describe or characterize the marvellous work here undertaken and so faultlessly pushed to completion by Dr. Gould, during the fifteen years of self-imposed exile from his native land, with unfaltering devotion and energy, in the face of difficulty and domestic bereavement. The work on the uranography of the southern heavens was finished in 1874, and was published under the title of the "Uranometria Argentina," which will remain a classic for all time. The zone observations of the stars between 23° and 80° south declination,

which were the original and always the dominant object of the enterprise, were begun in 1872, substantially completed in 1877, and revised in 1882–83. This work was embodied in the Zone Catalogues, containing 73,160 stars, which appeared in 1884. Parallel with this, and almost overshadowing it in importance, was carried on the independent series of meridian-circle observations for the General Catalogue of 32,448 stars, completed in 1885. Dr. Gould, besides, left the manuscript of the remainder of his series of fifteen volumes, not then published, — containing the observations and the annual catalogues, incorporated in the General Catalogue, — complete to the minutest detail, ready for the printer. These have since appeared, from time to time, — the last volume, rounding out his work, reaching Cambridge but a few hours before his death.

Another part of the work for the Cordoba Observatory, planned by Dr. Gould as a fitting extension of it, was a "Durchmusterung" of the southern sky. For this, indeed, he had provided the instrumental means and trained the assistants, it being his purpose to be ready to begin it at any time in case of any unforeseen delay or accident to the other work. On leaving Cordoba he confided it to the care of Dr. Thome, by whom, with Mr. Tucker, it has been so worthily conducted.

Dr. Gould also established, under the auspices of the Argentine government, a meteorological service, second in extent, it is believed, only to that of the United States. Upon leaving South America he intrusted this charge to the hands of his worthy successor, Walter G. Davis.

The earliest to recognize and demonstrate the capabilities of photography to render service to the astronomy of precision, Dr. Gould, by his experience with the Rutherfurd plates of the Pleiades and the Præsepe, was incited to arrange to carry forward at Cordoba, on an extensive scale, a similar work upon the southern stellar clusters. His other labors there were so onerous that he confined his attention to securing plates suitable for precise measurement. Of these he accumulated about 1400, and brought them home with him for measurement and reduction. Without permitting himself a well earned retirement, he turned at once, tirelessly, to this labor, which has been the principal occupation of the last ten years of his life. This is substantially complete, and will be given to the world as it came from his hand.

Dr. Gould had an enthusiasm for the advancement of his beloved science far wider than the limits of what he could by personal investigation accomplish. Early in his career he keenly realized that astronomy had reached a stage of development in America which entitled it to a higher

claim than had yet been accorded to it; and that a journal worthily supporting the dignity of a pure science would have very great influence upon its future progress. Accordingly, without ostentation, he established the "Astronomical Journal" in November, 1849, offering it to the use of astronomers, for the publication exclusively of original investigations. He edited and supported it until, at the end of the sixth volume, in 1861, its issue was suspended, first by the war for the preservation of the Union, afterward by his absence in Cordoba. A long nurtured hope was realized when he was enabled, in 1885, to resume its publication, and to continue it, at the rate of nearly one volume annually, to the present time. Of all the great enterprises of his life, this is the one which he has most cherished. With careful forethought, he has made due provision for its continuance.

Dr. Gould took a deep interest in the work of the International Committee of Weights and Measures, of which he was a most influential member. He represented both the United States and the Argentine Republic on that Committee, and was a constant attendant upon its annual conferences in Paris. He was President of the American Metrological Society and of the Colonial Society of Massachusetts from their inception. He was one of the original charter members of the National Academy of Sciences, and has been a member of the American Academy of Arts and Sciences since 1847, and one of its Vice-Presidents since 1895. He received the degree of Ph. D. from Göttingen in 1848, and that of LL. D. from Harvard in 1885, and from Columbia in 1887. During his illustrious career he was the recipient of the highest honors that Europe has to bestow, to an extent scarcely vouchsafed to any other American. A few only will be named here. Mem. Roy. Soc. (London): For. Assoc. Roy. Astr. Soc. (London): Cor. Mem. Acad. Sci. (Institut de France): Acad. Imp. Sci. (St. Petersburg): Kön. Akad. Wiss. (Berlin): Kön. Ges. Wiss. (Göttingen): Kais. Akad. Wiss. (Vienna): Bur. d. Long. (Paris). He was also knighted, of the Order Pour le Mérite, by Prussia.

Dr. Gould came, on both paternal and maternal sides, of old Colonial stock. The interest which he took throughout life in genealogy and the history of the early founders of New England was the outcome, not so much, perhaps, of pride of ancestry, as it was of his intense patriotism, which was one of his most marked characteristics. Next to the sacred domestic ties and the innumerable personal friendships which he so tenderly cherished, even before his devotion to his beloved science, came his affection for and pride in his country. No more vivid exemplification of

this can be given than his remarkable utterance, prefacing the sixth volume of the "Astronomical Journal," on the occasion of its temporary suspension by the war in 1861: "There is but one mode of laboring for Cisatlantic science to-day, namely, by struggling for the maintenance of civilization against barbarism in the Western Hemisphere. And this leaves little opportunity for astronomical research. Those who may not fight against armed treason may at least assume the burdens of those who do."

Dr. Gould married, in 1861, Mary Apthorp Quincy, daughter of the Hon. Josiah Quincy. She died in 1883. Never was there a nobler example of a wife's self-sacrifice than hers, in the endurance of privation and self-imposed exile, the severance of family and social ties, for the purpose of making possible the accomplishment of a husband's life-work.

Dr. Gould died on Thanksgiving day, November 26, 1896. His memory and achievements are a precious heritage to his country and his science.

SETH C. CHANDLER.

The Academy has received an accession of one Resident Fellow, one Associate Fellow, and three Foreign Honorary Members.

The roll of the Academy, corrected to date, includes the names of one hundred and ninety-three Resident Fellows, ninety-three Associate Fellows, and sixty-six Foreign Honorary Members.

MAY 12, 1897.

LIST

OF THE

FELLOWS AND FOREIGN HONORARY MEMBERS.

(Corrected to June 1, 1897.)

RESIDENT FELLOWS. — 195.

(Number limited to two hundred.)

Class I. — *Mathematical and Physical Sciences.* — 75.

Section I. — 17.

Mathematics and Astronomy.

Solon I. Bailey,	Arequipa, Peru.
Seth C. Chandler,	Cambridge.
Alvan G. Clark,	Cambridgeport.
J. Rayner Edmands,	Cambridge.
Francis M. Green,	Boston.
Gustavus Hay,	Boston.
Henry Mitchell,	Boston.
Edward C. Pickering,	Cambridge.
John Ritchie, Jr.,	Boston.
John D. Runkle,	Brookline.
T. H. Safford,	Williamstown.
Edwin F. Sawyer,	Brighton.
Arthur Searle,	Cambridge.
William E. Story,	Worcester.
Henry Taber,	Worcester.
O. C. Wendell,	Cambridge.
P. S. Yendell,	Dorchester.

Section II. — 23.

Physics.

A. Graham Bell,	Washington.
Clarence J. Blake,	Boston.
Francis Blake,	Weston.
John H. Blake,	Boston.
Charles R. Cross,	Boston.
Amos E. Dolbear,	Somerville.
H. M. Goodwin,	Boston.
Edwin H. Hall,	Cambridge.
Hammond V. Hayes,	Cambridge.
Silas W. Holman,	Boston.
William L. Hooper,	Somerville.
William W. Jacques,	Newton.
Alonzo S. Kimball,	Worcester.
Frank A. Laws,	Boston.
T. C. Mendenhall,	Worcester.
Benjamin O. Peirce,	Cambridge.
A. Lawrence Rotch,	Boston.
Wallace C. Sabine,	Cambridge.
John S. Stone,	Boston.
Elihu Thomson,	Lynn.
John Trowbridge,	Cambridge.
A. G. Webster,	Worcester.
Robert W. Willson,	Cambridge.

Section III. — 22.

Chemistry.

Samuel Cabot,	Boston.
Arthur M. Comey,	Cambridge.
Thos. M. Drown,	So. Bethlehem, Pa.
Charles W. Eliot,	Cambridge.
Thomas Gaffield,	Boston.
Henry B. Hill,	Cambridge.

Henry M. Howe,	Boston.
Charles L. Jackson,	Cambridge.
Walter L. Jennings,	Worcester.
Leonard P. Kinnicutt,	Worcester.
Charles F. Mabery,	Cleveland, O.
Arthur Michael,	Boston.
George D. Moore,	Worcester.
Charles E. Munroe,	Washington.
John U. Nef,	Chicago.
Robert H. Richards,	Boston.
Theodore W. Richards,	Cambridge.
Charles R. Sanger,	St. Louis.
Stephen P. Sharples,	Cambridge.
Francis H. Storer,	Boston.
Charles H. Wing,	Ledger, N. C.
Edward S. Wood,	Boston.

SECTION IV. — 13.

Technology and Engineering.

Eliot C. Clarke,	Boston.
Gaetano Lanza,	Boston.
E. D. Leavitt,	Cambridgeport.
William R. Livermore,	Boston.
Hiram F. Mills,	Lowell.
Cecil H. Peabody,	Boston.
Alfred P. Rockwell,	Manchester.
Andrew H. Russell,	Rock Island, Ill.
Peter Schwamb,	Arlington.
Charles S. Storrow,	Boston.
George F. Swain,	Boston.
William Watson,	Boston.
Morrill Wyman,	Cambridge.

CLASS II. — *Natural and Physiological Sciences.* — 63.

SECTION I. — 13.

Geology, Mineralogy, and Physics of the Globe.

H. H. Clayton,	Milton.
Algernon Coolidge,	Boston.
William O. Crosby,	Boston.
William M. Davis,	Cambridge.
Benj. K. Emerson,	Amherst.
O. W. Huntington,	Cambridge.
Robert T. Jackson,	Boston.
Jules Marcou,	Cambridge.
William H. Niles,	Cambridge.
John E. Pillsbury,	Boston.
Nathaniel S. Shaler,	Cambridge.
Warren Upham,	St. Paul, Minn.
John E. Wolff,	Cambridge.

SECTION II. — 9.

Botany.

William G. Farlow,	Cambridge.
Charles E. Faxon,	Boston.
George L. Goodale,	Cambridge.
H. H. Hunnewell,	Wellesley.
B. L. Robinson,	Cambridge.
Charles S. Sargent,	Brookline.
Arthur B. Seymour,	Cambridge.
Charles J. Sprague,	Boston.
Roland Thaxter,	Cambridge.

SECTION III. — 26.

Zoölogy and Physiology.

Alexander Agassiz,	Cambridge.
Robert Amory,	Boston.
James M. Barnard,	Milton.
Henry P. Bowditch,	Boston.
William Brewster,	Cambridge.
Louis Cabot,	Brookline.
Samuel F. Clarke,	Williamstown.
W. T. Councilman,	Boston.
Charles B. Davenport,	Cambridge.
Harold C. Ernst,	Boston.
Charles H. Fernald,	Amherst.
J. Walter Fewkes,	Boston.
Edward G. Gardiner,	Boston.
Samuel Henshaw,	Cambridge.
Alpheus Hyatt,	Cambridge.
John S. Kingsley,	Somerville.
Theodore Lyman,	Brookline.
Edward L. Mark,	Cambridge.
Charles S. Minot,	Boston.
Edward S. Morse,	Salem.
George H. Parker,	Cambridge.
James J. Putnam,	Boston.
Samuel H. Scudder,	Cambridge.
William T. Sedgwick,	Boston.
James C. White,	Boston.
William M. Woodworth,	Cambridge.

SECTION IV. — 15.

Medicine and Surgery.

Samuel L. Abbot,	Boston.
Edward H. Bradford,	Boston.
Arthur T. Cabot,	Boston.
David W. Cheever,	Boston.
Frank W. Draper,	Boston.
Thomas Dwight,	Boston.
Reginald H. Fitz,	Boston.
Charles F. Folsom,	Boston.
Frederick I. Knight,	Boston.
Francis Minot,	Hyde Park.
Samuel J. Mixter,	Boston.
W. L. Richardson,	Boston.
Theobald Smith,	Boston.
Henry P. Walcott,	Cambridge.
John C. Warren,	Boston.

CLASS III. — *Moral and Political Sciences.* — 57.

SECTION I. — 9.

Philosophy and Jurisprudence.

James B. Ames,	Cambridge.
Charles C. Everett,	Cambridge.
Horace Gray,	Boston.
John C. Gray,	Boston.
G. Stanley Hall,	Worcester.
Nathaniel Holmes,	Cambridge.
John E. Hudson,	Boston.
Josiah Royce,	Cambridge.
James B. Thayer,	Cambridge.

SECTION II. — 21.

Philology and Archæology.

William S. Appleton,	Boston.
Charles P. Bowditch,	Boston.
Lucien Carr,	Cambridge.
Franklin Carter,	Williamstown.
Joseph T. Clarke,	Boston.
Henry G. Denny,	Boston.
Epes S. Dixwell,	Cambridge.
William Everett,	Quincy.
William W. Goodwin,	Cambridge.
Henry W. Haynes,	Boston.
David G. Lyon,	Cambridge.
Bennett H. Nash,	Boston.
Frederick W. Putnam,	Cambridge.
Edward Robinson,	Boston.
F. B. Stephenson,	Boston.
Joseph H. Thayer,	Cambridge.
Crawford H. Toy,	Cambridge.
John W. White,	Cambridge.
Justin Winsor,	Cambridge.
John H. Wright,	Cambridge.
Edward J. Young,	Waltham.

SECTION III. — 16.

Political Economy and History.

Charles F. Adams,	Lincoln.
Edward Atkinson,	Boston.
Mellen Chamberlain,	Chelsea.
John Cummings,	Woburn.
Andrew M. Davis,	Cambridge.
Charles F. Dunbar,	Cambridge.
Samuel Eliot,	Boston.
John Fiske,	Cambridge.
A. C. Goodell, Jr.,	Salem.
Henry C. Lodge,	Nahant.
A. Lawrence Lowell,	Boston.
Augustus Lowell,	Boston.
John C. Ropes,	Boston.
Denman W. Ross,	Cambridge.
Charles C. Smith,	Boston.
F. W. Taussig,	Cambridge.

SECTION IV. — 11.

Literature and the Fine Arts.

Francis Bartlett,	Boston.
John Bartlett,	Cambridge.
George S. Boutwell,	Groton.
J. Elliot Cabot,	Brookline.
T. W. Higginson,	Cambridge.
S. R. Koehler,	Boston.
Charles G. Loring,	Boston.
Percival Lowell,	Brookline.
Charles Eliot Norton,	Cambridge.
Horace E. Scudder,	Cambridge.
Barrett Wendell,	Boston.

ASSOCIATE FELLOWS. — 96.

(Number limited to one hundred. Elected as vacancies occur.)

Class I. — *Mathematical and Physical Sciences.* — 36.

Section I. — 15.

Mathematics and Astronomy.

Edward E. Barnard,	Chicago.
S. W. Burnham,	Chicago.
George Davidson,	San Francisco.
Fabian Franklin,	Baltimore.
Asaph Hall,	Washington.
George W. Hill,	Washington.
E. S. Holden,	Mt. Hamilton, Cal.
James E. Keeler,	Allegheny, Pa.
Emory McClintock,	New York.
Simon Newcomb,	Washington.
Charles L. Poor,	Baltimore.
William A. Rogers,	Waterville, Me.
George M. Searle,	Washington.
J. N. Stockwell,	Cleveland, O.
Chas. A. Young,	Princeton, N.J.

Section II. — 7.

Physics.

Carl Barus,	Providence, R.I.
J. Willard Gibbs,	New Haven.
S. P. Langley,	Washington.
A. M. Mayer,	Hoboken, N. J.
A. A. Michelson,	Chicago.
Ogden N. Rood,	New York.
H. A. Rowland,	Baltimore.

Section III. — 7.

Chemistry.

Wolcott Gibbs,	Newport, R.I.
Frank A. Gooch,	New Haven.
S. W. Johnson,	New Haven.
J. W. Mallet,	Charlottesville, Va.
E. W. Morley,	Cleveland, O.
J. M. Ordway,	New Orleans.
Ira Remsen,	Baltimore.

Section IV. — 7.

Technology and Engineering.

Henry L. Abbot,	New York.
Cyrus B. Comstock,	Washington.
W. P. Craighill,	Washington.
F. R. Hutton,	New York.
George S. Morison,	Chicago.
William Sellers,	Philadelphia.
Robt. S. Woodward,	New York.

Class II. — *Natural and Physiological Sciences.* — 31.

Section I. — 15.

Geology, Mineralogy, and Physics of the Globe.

Cleveland Abbe,	Washington.
George J. Brush,	New Haven.
Edward S. Dana,	New Haven.
Walter G. Davis,	Cordova, Arg.
Sir J. W. Dawson,	Montreal.
G. K. Gilbert,	Washington.
James Hall,	Albany, N.Y.
Clarence King,	New York.
Joseph LeConte,	Berkeley, Cal.
J. Peter Lesley,	Philadelphia.
S. L. Penfield,	New Haven.
J. W. Powell,	Washington.
R. Pumpelly,	Newport, R.I.
A. R. C. Selwyn,	Ottawa.
G. C. Swallow,	Columbia, Mo.

SECTION II. — 3.

Botany.

A. W. Chapman,	Apalachicola, Fla.
W. Trelease,	St. Louis.
John D. Smith,	Baltimore.

SECTION III. — 6.

Zoölogy and Physiology.

Joel A. Allen,	New York.
W. K. Brooks,	Baltimore.
O. C. Marsh,	New Haven.
S. Weir Mitchell,	Philadelphia.
A. S. Packard,	Providence.
A. E. Verrill,	New Haven.

SECTION IV. — 7.

Medicine and Surgery.

John S. Billings,	New York.
Jacob M. Da Costa,	Philadelphia.
W. A. Hammond,	New York.
William Osler,	Baltimore.
Alfred Stillé,	Philadelphia.
Wm. H. Welch,	Baltimore.
H. C. Wood,	Philadelphia.

CLASS III. — *Moral and Political Sciences.* — 29.

SECTION I. — 5.

Philosophy and Jurisprudence.

T. M. Cooley,	Ann Arbor, Mich.
D. R. Goodwin,	Philadelphia.
Charles S. Peirce,	New York.
T. R. Pynchon,	Hartford, Conn.
Jeremiah Smith,	Cambridge.

SECTION II. — 7.

Philology and Archæology.

A. N. Arnold,	Pawtuxet, R.I.
Timothy Dwight,	New Haven.
B. L. Gildersleeve,	Baltimore.
D. C. Gilman,	Baltimore.
T. R. Lounsbury,	New Haven.
E. E. Salisbury,	New Haven.
A. D. White,	Ithaca, N.Y.

SECTION III. — 9.

Political Economy and History.

Henry Adams,	Washington.
G. P. Fisher,	New Haven.
M. F. Force,	Cincinnati.
H. E. von Holst,	Chicago.
Henry C. Lea,	Philadelphia.
Edward J. Phelps,	Burlington, Vt.
W. G. Sumner,	New Haven.
J. H. Trumbull,	Hartford, Conn.
David A. Wells,	Norwich, Conn.

SECTION IV. — 8.

Literature and the Fine Arts.

James B. Angell,	Ann Arbor, Mich.
L. P. di Cesnola,	New York.
F. E. Church,	New York.
H. H. Furness,	Philadelphia.
R. S. Greenough,	Florence.
Augustus St. Gaudens,	New York.
E. C. Stedman,	Bronxville, N.Y.
W. R. Ware,	New York.

FOREIGN HONORARY MEMBERS. — 65.

(Number limited to seventy-five. Elected as vacancies occur.)

Class I. — *Mathematical and Physical Sciences.* — 22.

Section I. — 7.

Mathematics and Astronomy.

Arthur Auwers,	Berlin.
Francesco Brioschi,	Milan.
H. A. E. A. Faye,	Paris.
Charles Hermite,	Paris.
William Huggins,	London.
Otto Struve,	Karlsruhe.
H. C. Vogel,	Potsdam.

Section II. — 4.

Physics.

Boltzmann,	Vienna.
A. Cornu,	Paris.
Lord Rayleigh,	Witham.
Sir G. G. Stokes, Bart.,	Cambridge.

Section III. — 8.

Chemistry.

Adolf Baeyer,	Munich.
Marcellin Berthelot,	Paris.
Robert Bunsen,	Heidelberg.
J. H. van't Hoff,	Amsterdam.
Mendeleeff,	St. Petersburg.
Victor Meyer,	Heidelberg.
Sir H. E. Roscoe,	London.
Julius Thomsen,	Copenhagen.

Section IV. — 3.

Technology and Engineering.

Sir Henry Bessemer,	London.
Lord Kelvin,	Glasgow.
Maurice Lévy,	Paris.

Class II. — *Natural and Physiological Sciences.* — 23.

Section I. — 5.

Geology, Mineralogy, and Physics of the Globe.

Alfred Des Cloizeaux,	Paris.
A. E. Nordenskiöld,	Stockholm.
C. F. Rammelsberg,	Berlin.
Henry C. Sorby,	Sheffield.
Heinrich Wild,	Zurich.

Section II. — 6.

Botany.

J. G. Agardh,	Lund.
E. Bornet,	Paris.
Sir Joseph D. Hooker,	Sunningdale.
W. Pfeffer,	Leipsic.
Solms-Laubach,	Strasburg.
Eduard Strasburger,	Bonn.

SECTION III. — 8.

Zoölogy and Physiology.

Michael Foster,	Cambridge.
Carl Gegenbauer,	Heidelberg.
Ludimar Hermann,	Königsberg.
Albrecht Kölliker,	Würzburg.
A. Kovalevskij,	St. Petersburg.
Lacaze-Duthiers,	Paris.
Rudolph Leuckart,	Leipsic.
J. J. S. Steenstrup,	Copenhagen.

SECTION IV. — 4.

Medicine and Surgery.

W. Kühne,	Heidelberg.
Lord Lister,	London.
Sir James Paget, Bart.,	London.
Rudolph Virchow,	Berlin.

CLASS III. — *Moral and Political Sciences.* — 20.

SECTION I. — 3.

Philosophy and Jurisprudence.

James Martineau,	London.
Sir Frederick Pollock,	Oxford.
Henry Sidgwick,	Cambridge.

SECTION II. — 7.

Philology and Archæology.

Ingram Bywater,	Oxford.
Sir John Evans,	Hemel Hempstead.
Pascual de Gayangos,	Madrid.
J. W. A. Kirchhoff,	Berlin.
G. C. C. Maspero,	Paris.
Max Müller,	Oxford.
Karl Weinhold,	Berlin.

SECTION III. — 7.

Political Economy and History.

Duc de Broglie,	Paris.
James Bryce,	Oxford.
W. Dörpfeld,	Athens.
W. E. Gladstone,	Hawarden.
Hermann Grimm,	Berlin.
Theodor Mommsen,	Berlin.
William Stubbs,	Oxford.

SECTION IV. — 3.

Literature and the Fine Arts.

Jean Léon Gérôme,	Paris.
John Ruskin,	Coniston.
Leslie Stephen,	London.

STATUTES AND STANDING VOTES.

STATUTES.

Adopted May 30, 1854: *amended September* 8, 1857, *November* 12, 1862, *May* 24, 1864, *November* 9, 1870, *May* 27, 1873, *January* 26, 1876, *June* 16, 1886, *October* 8, 1890, *January* 11 *and May* 10, 1893, *April* 11, *May* 9, *and October* 10, 1894, *and March* 13, *April* 10, *and May* 8, 1895.

CHAPTER I.

Of Fellows and Foreign Honorary Members.

1. The Academy consists of *Fellows* and *Foreign Honorary Members*. They are arranged in three Classes, according to the Arts and Sciences in which they are severally proficient, viz.: Class I. The Mathematical and Physical Sciences; — Class II. The Natural and Physiological Sciences; — Class III. The Moral and Political Sciences. Each Class is divided into four Sections, viz.: Class I., Section 1. Mathematics and Astronomy; — Section 2. Physics; — Section 3. Chemistry; — Section 4. Technology and Engineering. Class II., Section 1. Geology, Mineralogy, and Physics of the Globe; — Section 2. Botany; — Section 3. Zoölogy and Physiology; — Section 4. Medicine and Surgery. Class III., Section 1. Philosophy and Jurisprudence; — Section 2. Philology and Archæology; — Section 3. Political Economy and History; — Section 4. Literature and the Fine Arts.

2. Fellows, resident in the State of Massachusetts, only, may vote at the meetings of the Academy.* Each Resident Fellow shall pay an admission fee of ten dollars and such annual assessment, not exceeding ten dollars, as shall be voted by the Academy at each Annual Meeting.

* The number of Resident Fellows is limited by the Charter to 200.

3. Fellows residing out of the State of Massachusetts shall be known and distinguished as Associate Fellows. They shall not be liable to the payment of any fees or annual dues, but on removing within the State shall be admitted to the privileges,* and be subject to the obligations, of Resident Fellows. The number of Associate Fellows shall not exceed *one hundred*, of whom there shall not be more than *forty* in either of the three Classes of the Academy.

4. The number of Foreign Honorary Members shall not exceed *seventy-five;* and they shall be chosen from among persons most eminent in foreign countries for their discoveries and attainments in either of the three departments of knowledge above enumerated. And there shall not be more than *thirty* Foreign Members in either of these departments.

CHAPTER II.

Of Officers.

1. There shall be a President, three Vice-Presidents, one for each Class, a Corresponding Secretary, a Recording Secretary, a Treasurer, and a Librarian, which officers shall be annually elected, by ballot, at the Annual Meeting, on the second Wednesday in May.

2. At the same time, and in the same manner, nine Councillors shall be elected, three from each Class of the Academy, but the same Fellows shall not be eligible on more than three successive years. These nine Councillors, with the President, the three Vice-Presidents, the two Secretaries, the Treasurer, and the Librarian, shall constitute the Council. It shall be the duty of this Council to exercise a discreet supervision over all nominations and elections. With the consent of the Fellow interested, they shall have power to make transfers between the several Sections of the same Class, reporting their action to the Academy.

3. If any office shall become vacant during the year, the vacancy shall be filled by a new election, and at the next stated meeting, or at a meeting called for this purpose.

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* Associate Fellows may attend, but cannot vote, at meetings of the Academy. See Chapter I. 2.

CHAPTER III.

Of Nominations of Officers.

1. At the stated meeting in March, the President shall appoint from the next retiring Councillors a Nominating Committee of three Fellows, one for each class.

2. It shall be the duty of this Nominating Committee to prepare a list of candidates for the offices of President, Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, Librarian, Councillors, and the Standing Committees which are chosen by ballot; and to cause this list to be sent by mail to all the Resident Fellows of the Academy not later than four weeks before the Annual Meeting.

3. Independent nominations for any office, signed by at least five Resident Fellows and received by the Recording Secretary not less than ten days before the Annual Meeting, shall be inserted in the call for the Annual Meeting, which shall then be issued not later than one week before that meeting.

4. The Recording Secretary shall prepare for use, in voting at the Annual Meeting, a ballot containing the names of all persons nominated for office under the conditions given above.

5. When an office is to be filled at any other time than at the Annual Meeting, the President shall appoint a Nominating Committee, in accordance with the provisions of Section 1, which shall announce its nomination in the manner prescribed in Section 2 at least two weeks before the time of election. Independent nominations, signed by at least five Resident Fellows and received by the Recording Secretary not later than one week before the meeting for election, shall be inserted in the call for that meeting.

CHAPTER IV.

Of the President.

1. It shall be the duty of the President, and, in his absence, of the senior Vice-President present, or next officer in order as above enumerated, to preside at the meetings of the Academy; to summon extraordinary meetings, upon any urgent occasion; and to execute or see to the execution of the Statutes of the

Academy. Length of continuous membership in the Academy shall determine the seniority of the Vice-Presidents.

2. The President, or, in his absence, the next officer as above enumerated, is empowered to draw upon the Treasurer for such sums of money as the Academy shall direct. Bills presented on account of the Library, or the Publications of the Academy, must be previously approved by the respective committees on these departments.

3. The President, or, in his absence, the next officer as above enumerated, shall nominate members to serve on the different committees of the Academy which are not chosen by ballot.

4. Any deed or writing to which the common seal is to be affixed shall be signed and sealed by the President, when thereto authorized by the Academy.

CHAPTER V.

Of Standing Committees.

1. At the Annual Meeting there shall be chosen the following Standing Committees, to serve for the year ensuing, viz.: —

2. The Committee of Finance, to consist of the President, Treasurer, and one Fellow chosen by ballot, who shall have charge of the investment and management of the funds and trusts of the Academy. The general appropriations for the expenditures of the Academy shall be moved by this Committee at the Annual Meeting, and all special appropriations from the general and publication funds shall be referred to or proposed by this Committee.

3. The Rumford Committee, of seven Fellows, to be chosen by ballot, who shall consider and report on all applications and claims for the Rumford Premium, also on all appropriations from the income of the Rumford Fund, and generally see to the due and proper execution of this trust.

4. The C. M. Warren Committee, of seven Fellows, to be chosen by ballot, who shall consider and report on all applications for appropriations from the income of the C. M. Warren Fund, and generally see to the due and proper execution of this trust.

5. The Committee of Publication, of three Fellows, to whom all memoirs submitted to the Academy shall be referred, and to

whom the printing of memoirs accepted for publication shall be intrusted.

6. The Committee on the Library, of three Fellows, who shall examine the Library, and make an annual report on its condition and management.

7. An Auditing Committee, of two Fellows, for auditing the accounts of the Treasurer.

CHAPTER VI.

Of the Secretaries.

1. The Corresponding Secretary shall conduct the correspondence of the Academy, recording or making an entry of all letters written in its name, and preserving on file all letters which are received; and at each meeting he shall present the letters which have been addressed to the Academy since the last meeting. With the advice and consent of the President, he may effect exchanges with other scientific associations, and also distribute copies of the publications of the Academy among the Associate Fellows and Foreign Honorary Members, as shall be deemed expedient; making a report of his proceedings at the Annual Meeting. Under the direction of the Council for Nomination, he shall keep a list of the Fellows, Associate Fellows, and Foreign Honorary Members, arranged in their Classes and in Sections in respect to the special sciences in which they are severally proficient; and he shall act as secretary to the Council.

2. The Recording Secretary shall have charge of the Charter and Statute-book, journals, and all literary papers belonging to the Academy. He shall record the proceedings of the Academy at its meetings; and after each meeting is duly opened, he shall read the record of the preceding meeting. He shall notify the meetings of the Academy, and apprise committees of their appointment. He shall post up in the Hall a list of the persons nominated for election into the Academy; and when any individual is chosen, he shall insert in the record the names of the Fellows by whom he was nominated.

3. The two Secretaries, with the Chairman of the Committee of Publication, shall have authority to publish such of the proceedings of the Academy as as may seem to them calculated to promote the interests of science.

CHAPTER VII.

Of the Treasurer.

1. The Treasurer shall give such security for the trust reposed in him as the Academy shall require.

2. He shall receive officially all moneys due or payable, and all bequests or donations made to the Academy, and by order of the President or presiding officer shall pay such sums as the Academy may direct. He shall keep an account of all receipts and expenditures; shall submit his accounts to the Auditing Committee; and shall report the same at the expiration of his term of office.

3. The Treasurer shall keep a separate account of the income and appropriation of the Rumford Fund, and report the same annually.

4. All moneys which there shall not be present occasion to expend shall be invested by the Treasurer, under the direction of the Finance Committee, on such securities as the Academy shall direct.

CHAPTER VIII.

Of the Librarian and Library.

1. It shall be the duty of the Librarian to take charge of the books, to keep a correct catalogue of same, and to provide for the delivery of books from the Library. He shall also have the custody of the publications of the Academy.

2. The Librarian, in conjunction with the Committee on the Library, shall have authority to expend, as they may deem expedient, such sums as may be appropriated, either from the Rumford or the General Fund of the Academy, for the purchase of books, and for defraying other necessary expenses connected with the Library. They shall have authority to propose rules and regulations concerning the circulation, return, and safe-keeping of books; and to appoint such agents for these purposes as they may think necessary.

3. To all books in the Library procured from the income of the Rumford Fund, the Librarian shall cause a stamp or label to be affixed, expressing the fact that they were so procured.

4. Every person who takes a book from the Library shall give a receipt for the same to the Librarian or his assistant.

5. Every book shall be returned in good order, regard being had to the necessary wear of the book with good usage. And if any book shall be lost or injured, the person to whom it stands charged shall replace it by a new volume or set, if it belongs to a set, or pay the current price of the volume or set to the Librarian; and thereupon the remainder of the set, if the volume belonged to a set, shall be delivered to the person so paying for the same.

6. All books shall be returned to the Library for examination at least one week before the Annual Meeting.

CHAPTER IX.

Of Meetings.

1. There shall be annually four stated meetings of the Academy; namely, on the second Wednesday in May (the Annual Meeting), on the second Wednesday in October, on the second Wednesday in January, and on the second Wednesday in March. At these meetings only, or at meetings adjourned from these and regularly notified, shall appropriations of money be made, or alterations of the statutes or standing votes of the Academy be effected.

2. Fifteen Fellows shall constitute a quorum for the transaction of business at a stated meeting. Seven Fellows shall be sufficient to constitute a meeting for scientific communications and discussions.

3. The Recording Secretary shall notify the meetings of the Academy to each Fellow residing in Boston and the vicinity; and he may cause the meetings to be advertised, whenever he deems such further notice to be needful.

CHAPTER X.

Of the Election of Fellows and Honorary Members.

1. Elections shall be made by ballot, and only at stated meetings.

2. Candidates for election as Resident Fellows must be proposed by two or more Resident Fellows, in a recommendation signed by them, specifying the Section to which the nomination is made, which recommendation shall be transmitted to the Corresponding Secretary, and by him referred to the Council for Nomination. No person recommended shall be reported by the Council as a candidate for election, unless he shall have received a written approval, signed at a meeting of the Council by at least seven of its members. All nominations thus approved shall be read to the Academy at a stated meeting, and shall then stand on the nomination list during the interval between two stated meetings, and until the balloting. No person shall be elected a Resident Fellow, unless he shall have been resident in this Commonwealth one year next preceding his election. If any person elected a Resident Fellow shall neglect for one year to pay his admission fee, his election shall be void; and if any Resident Fellow shall neglect to pay his annual assessments for two years, provided that his attention shall have been called to this article, he shall be deemed to have abandoned his Fellowship; but it shall be in the power of the Treasurer, with the consent of the Council, to dispense (*sub silentio*) with the payment both of the admission fee and of the assessments, whenever in any special instance he shall think it advisable so to do.

3. The nomination of Associate Fellows shall take place in the manner prescribed in reference to Resident Fellows; and after such nomination shall have been publicly read at a stated meeting previous to that when the balloting takes place, it shall be referred to the Council for Nomination; and a written approval, authorized and signed at a meeting of said Council by at least seven of its members, shall be requisite to entitle the candidate to be balloted for. The Council may in like manner originate nominations of Associate Fellows, which must be read at a stated meeting previous to the election, and be exposed on the nomination list during the interval.

4. Foreign Honorary Members shall be chosen only after a nomination made at a meeting of the Council, signed at the time by at least seven of its members, and read at a stated meeting previous to that on which the balloting takes place.

5. Three fourths of the ballots cast must be affirmative, and the number of affirmative ballots must amount to eleven to effect an election of Fellows or Foreign Honorary Members.

6. Each Section of the Academy is empowered to present lists of persons deemed best qualified to fill vacancies occurring in the number of Foreign Honorary Members or Associate Fellows allotted to it; and such lists, after being read at a stated meeting, shall be referred to the Council for Nomination.

7. If, in the opinion of a majority of the entire Council, any Fellow — Resident or Associate — shall have rendered himself unworthy of a place in the Academy, the Council shall recommend to the Academy the termination of his Fellowship; and provided that a majority of two thirds of the Fellows at a stated meeting, consisting of not less than fifty Fellows, shall adopt this recommendation, his name shall be stricken off the roll of Fellows.

CHAPTER XI.

Of Amendments of the Statutes.

1. All proposed alterations of the Statutes, or additions to them, shall be referred to a committee, and, on their report at a subsequent meeting, shall require for enactment a majority of two thirds of the members present, and at least eighteen affirmative votes.

2. Standing Votes may be passed, amended, or rescinded, at any stated meeting, by a majority of two thirds of the members present. They may be suspended by a unanimous vote.

CHAPTER XII.

Of Literary Performances.

1. The Academy will not express its judgment on literary or scientific memoirs or performances submitted to it, or included in its publications.

STANDING VOTES.

1. Communications of which notice had been given to the Secretary shall take precedence of those not so notified.

2. Resident Fellows who have paid all fees and dues chargeable to them are entitled to receive one copy of each volume or article printed by the Academy, on application to the Librarian personally or by written order, within two years from the date of publication. And the current issues of the Proceedings shall be supplied, when ready for publication, free of charge, to all the Fellows and members of the Academy who desire to receive them.

3. The Committee of Publication shall fix from time to time the price at which the publications of the Academy may be sold. But members may be supplied at half this price with volumes which they are not entitled to receive free, and which are needed to complete their sets.

4. Two hundred extra copies of each paper accepted for publication in the Memoirs or Proceedings of the Academy shall be placed at the disposal of the author, free of charge.

5. Resident Fellows may borrow and have out from the Library six volumes at any one time, and may retain the same for three months, and no longer.

6. Upon special application, and for adequate reasons assigned, the Librarian may permit a larger number of volumes, not exceeding twelve, to be drawn from the Library for a limited period.

7. Works published in numbers, when unbound, shall not be taken from the Hall of the Academy, except by special leave of the Librarian.

8. Books, publications, or apparatus shall be procured from the income of the Rumford Fund only on the certificate of the Rumford Committee that they, in their opinion, will best facilitate and encourage the making of discoveries and improvements which may merit the Rumford Premium.

9. The Annual Meeting and the other stated meetings shall be holden at eight o'clock, P. M.

10. A meeting for receiving and discussing scientific communications may be held on the second Wednesday of each month not appointed for stated meetings, excepting July, August, and September.

RUMFORD PREMIUM.

In conformity with the terms of the gift of Benjamin, Count Rumford, granting a certain fund to the American Academy of Arts and Sciences, and with a decree of the Supreme Judicial Court for carrying into effect the general charitable intent and purpose of Count Rumford, as expressed in his letter of gift, the Academy is empowered to make from the income of said fund, as it now exists, at any Annual Meeting, an award of a gold and silver medal, being together of the intrinsic value of three hundred dollars, as a premium to the author of any important discovery or useful improvement in light or in heat, which shall have been made and published by printing, or in any way made known to the public, in any part of the continent of America, or any of the American islands; preference being always given to such discoveries as shall, in the opinion of the Academy, tend most to promote the good of mankind; and to add to such medals, as a further premium for such discovery and improvement, if the Academy see fit so to do, a sum of money not exceeding three hundred dollars.

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